

09/973,638

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\*\*\* YOU HAVE NEW MAIL \*\*\*

=> s aggregate? and particle? and oligonucleotide?  
L1 9108 AGGREGATE? AND PARTICLE? AND OLIGONUCLEOTIDE?

=> s l1 and aggregate? (10a) oligo?  
L2 220 L1 AND AGGREGATE? (10A) OLIGO?

=> s l2 and oligonucleotide? (10a) nanoparticle?  
L3 90 L2 AND OLIGONUCLEOTIDE? (10A) NANOPARTICLE?

=> dup rem l3  
PROCESSING COMPLETED FOR L3  
L4 73 DUP REM L3 (17 DUPLICATES REMOVED)

=> s l4 and (two or 2) (10a) nanoparticle?  
4 FILES SEARCHED...  
L5 64 L4 AND (TWO OR 2) (10A) NANOPARTICLE?

=> d l5 bib abs 1-64

L5 ANSWER 1 OF 64 CAPLUS COPYRIGHT 2004 ACS on STN  
AN 2003:335250 CAPLUS  
DN 138:349669  
TI Hybridization with probes bound to nanoparticles including signal  
generating systems  
IN Park, So-Jung; Taton, Thomas A.; Mirkin, Chad A.  
PA Nanosphere, Inc., USA  
SO PCT Int. Appl., 467 pp.  
CODEN: PIXXD2  
DT Patent  
LA English  
FAN.CNT 16

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2003035829	A2	20030501	WO 2002-US32088	20021008
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN,				
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,				
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,				
LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH,				

PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ,  
UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU,  
TJ, TM

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG,  
CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL,  
PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR,  
NE, SN, TD, TG

	US 2003087242	A1	20030508	US 2001-8978	20011207
PRAI	US 2001-327864P	P	20011009		
	US 2001-8978	A2	20011207		
	US 1996-31809P	P	19960729		
	WO 1997-US12783	A2	19970721		
	US 1999-240755	B2	19990129		
	US 1999-344667	A2	19990625		
	US 2000-176409P	P	20000113		
	US 2000-192699P	P	20000328		
	US 2000-200161P	P	20000426		
	US 2000-213906P	P	20000626		
	US 2000-603830	A2	20000626		
	US 2000-224631P	P	20000811		
	US 2000-254392P	P	20001208		
	US 2000-254418P	P	20001208		
	US 2000-255235P	P	20001211		
	US 2000-255236P	P	20001211		
	US 2001-760500	A2	20010112		
	US 2001-820279	A2	20010328		
	US 2001-282640P	P	20010409		
	US 2001-927777	A2	20010810		

AB The invention provides methods of detecting a nucleic acid by hybridization with probes immobilized on nanoparticles. A detectable change (preferably a color change) is brought about as a result of the hybridization of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. Color changes may be brought about by the interaction of reporter groups such as quantum dyes or fluorescent dyes that interact by FRET or by simple phys. processes such as aggregation and precipitation of gold **particles** as a result of the hybridization. The color change in aggregation can be brought about using **two** sets of **nanoparticles**. Each is labeled with an **oligonucleotide**. The two do not cross-hybridize but will cross hybridize with a free linker **oligonucleotide** of the appropriate sequence. The color resulting from the formation of the **aggregate** can be controlled by controlling the length of the linker **oligonucleotide** to control the separation of the **nanoparticles**. Hybridizations are sensitive to base-pair mismatches without the need to elute mismatches at different washing temps. and the color changes brought about by each hybridization can identify sequence variations. The invention also provides compns. and kits comprising **particles**. The invention further provides methods of synthesizing unique **nanoparticle-oligonucleotide** conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids. A number of variations of the basic method and applications of the method are described.

L5 ANSWER 2 OF 64 CAPLUS COPYRIGHT 2004 ACS on STN

AN 2001:731085 CAPLUS

DN 135:283930

TI **Nanoparticle-oligonucleotide** conjugates and their uses  
in nucleic acid detection and nanomaterial preparation

IN Mirkin, Chad A.; Letsinger, Robert L.; Mucic, Robert C.; Storhoff, James  
J.; Elghanian, Robert; Taton, Thomas Andrew; Park, So-Jung; Li, Zhi

PA Nanosphere Inc., USA

SO PCT Int. Appl., 403 pp.

CODEN: PIXXD2

DT Patent

LA English

FAN.CNT 16

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001073123	A2	20011004	WO 2001-US10071	20010328
	WO 2001073123	A3	20030206		
	WO 2001073123	B1	20040304		
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG			
	US 6506564	B1	20030114	US 2000-603830	20000626
	US 2002155442	A1	20021024	US 2001-760500	20010112
	US 2003022169	A1	20030130	US 2001-820279	20010328
	US 6750016	B2	20040615		
	EP 1301625	A2	20030416	EP 2001-928332	20010328
	R:	AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR			
	JP 2004515208	T2	20040527	JP 2001-570836	20010328
	WO 2002079490	A2	20021010	WO 2002-US11158	20020327
	WO 2002079490	A3	20030206		
	WO 2002079490	C2	20030320		
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
	US 2002192687	A1	20021219	US 2002-108211	20020327
	EP 1379693	A2	20040114	EP 2002-725590	20020327
	R:	AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR			
PRAI	US 2000-192699P	P	20000328		
	US 2000-200161P	P	20000426		
	US 2000-213906P	P	20000626		
	US 2000-603830	A	20000626		
	US 2000-254392P	P	20001208		
	US 2000-255235P	P	20001211		
	US 2001-760500	A	20010112		
	US 2001-820279	A	20010328		
	US 1996-31809P	P	19960729		
	WO 1997-US12783	A2	19970721		
	US 1999-240755	A2	19990129		
	US 1999-344667	A2	19990625		
	US 2000-176409P	P	20000113		
	WO 2001-US10071	W	20010328		
	US 2001-350560P	P	20011113		
	WO 2002-US11158	W	20020327		

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of **particles** having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached

to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compns. and kits comprising **particles**. The invention further provides methods of synthesizing unique **nanoparticle-oligonucleotide** conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

L5 ANSWER 3 OF 64 CAPLUS COPYRIGHT 2004 ACS on STN  
 AN 2001:621648 CAPLUS  
 DN 135:371949  
 TI Directed assembly of periodic materials from protein and **oligonucleotide**-modified **nanoparticle** building blocks  
 AU Park, So-Jung; Lazarides, Anne A.; Mirkin, Chad A.; Letsinger, Robert L.  
 CS Department of Chemistry and Center for Nanofabrication and Molecular Self Assembly, Northwestern University, Evanston, IL, 60208-3113, USA  
 SO Angewandte Chemie, International Edition (2001), 40(15), 2909-2912  
 CODEN: ACIEF5; ISSN: 1433-7851  
 PB Wiley-VCH Verlag GmbH  
 DT Journal  
 LA English  
 AB DNA-directed assembly of nanoparticles was achieved by linking thio-alkyl-substituted oligodeoxynucleotide chains to gold **nanoparticles** or biotin-substituted oligodeoxynucleotides to streptavidin, and then hybridizing the **two** with a complimentary oligodeoxynucleotide linker. The thermal dissociation of the **aggregates** showed features of both **aggregate particle** growth and DNA melting; one method of increasing the size of **aggregates** formed was to heat the mixture to a few degrees below the m.p.

L5 ANSWER 4 OF 64 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
 AN 2004-059754 [06] WPIDS  
 CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75]; 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22]; 2003-237646 [23]; 2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49]; 2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58]; 2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82]; 2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]  
 DNC C2004-024679  
 TI Detection of nucleic acid, e.g. viral RNA or DNA, comprises contacting nucleic acid with different types of **nanoparticles** having attached **oligonucleotides** and observing detectable change brought about by hybridization.  
 DC B04 D16  
 IN MIRKIN, C A; PARK, S; TATON, T A  
 PA (MIRK-I) MIRKIN C A; (PARK-I) PARK S; (TATO-I) TATON T A  
 CYC 1  
 PI US 2003207296 A1 20031106 (200406)\* 206  
 ADT US 2003207296 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-176409P 20000113, Provisional US 2000-192699P 20000328, Provisional US 2000-200161P 20000426, Provisional US 2000-213906P 20000626, CIP of US 2000-603830 20000626, Provisional US 2000-224631P 20000811, Provisional US 2000-254392P 20001208, Provisional US 2000-254418P 20001208, Provisional US 2000-255235P 20001211, Provisional US 2000-255236P 20001211, CIP of US 2001-760500 20010112, CIP of US 2001-820279 20010328, Provisional US 2001-282640P 20010409, CIP of

US 2001-927777 20010810, Provisional US 2001-327864P 20011009, CIP of US 2001-8978 20011207, US 2002-266983 20021008

FDT US 2003207296 A1 CIP of US 6361944, CIP of US 6506564

PRAI US 2002-266983 20021008; US 1996-31809P 19960729;  
WO 1997-US12783 19970721; US 1999-240755 19990129;  
US 1999-344667 19990625; US 2000-176409P 20000113;  
US 2000-192699P 20000328; US 2000-200161P 20000426;  
US 2000-213906P 20000626; US 2000-603830 20000626;  
US 2000-224631P 20000811; US 2000-254392P 20001208;  
US 2000-254418P 20001208; US 2000-255235P 20001211;  
US 2000-255236P 20001211; US 2001-760500 20010112;  
US 2001-820279 20010328; US 2001-282640P 20010409;  
US 2001-927777 20010810; US 2001-327864P 20011009;  
US 2001-8978 20011207

AN 2004-059754 [06] WPIDS

CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22];  
2003-237646 [23]; 2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45];  
2003-521746 [49]; 2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56];  
2003-615795 [58]; 2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80];  
2003-897536 [82]; 2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]

AB US2003207296 A UPAB: 20040123

NOVELTY - Detecting nucleic acid having at least two portions comprises contacting the nucleic acid with at least **two** types of **nanoparticles** having attached **oligonucleotides**; and observing a detectable change brought about by hybridization of the **oligonucleotides** on the **nanoparticles** with the nucleic acid.

DETAILED DESCRIPTION - Detecting nucleic acid having at least two portions comprises contacting the nucleic acid with at least **two** types of **nanoparticles** having attached **oligonucleotides**; and observing a detectable change brought about by hybridization of the **oligonucleotides** on the **nanoparticles** with the nucleic acid. The **oligonucleotides** on the first type of **nanoparticles** having a sequence complementary to a first portion of the sequence of the nucleic acid. The **oligonucleotides** on the second type of **nanoparticles** have a sequence complementary to a second portion of the sequence of the nucleic acid. The contacting takes place under conditions effective to allow hybridization of the **oligonucleotides** on the **nanoparticles** with the nucleic acid.

INDEPENDENT CLAIMS are also included for:

(1) a kit comprising container(s) holding a composition comprising at least **two** types of **nanoparticles** having **oligonucleotides**;

(2) an **aggregate** probe comprising at least **two** types of **nanoparticles** having attached **oligonucleotides**;

(3) a core probe comprising at least **two** types of **nanoparticles** having attached **oligonucleotides**;

(4) a satellite probe comprising a **particle** having attached **oligonucleotides**; and probe **oligonucleotides** hybridized to the **oligonucleotides** attached to the **nanoparticles**, wherein the probe **oligonucleotides** have a first portion having a sequence complementary to the sequence of the first portion of the **oligonucleotides** attached to the **particles**, and a second portion and wherein both portions have sequences complementary to portions of the sequence of the nucleic acid and the probe **oligonucleotides** further have a reporter molecule attached to one end;

(5) a method of nanofabrication comprising providing type(s) of linking **oligonucleotide** having a selected sequence having at least **two** portions; providing type(s) of **nanoparticles** having attached **oligonucleotides**; and contacting the linking

**oligonucleotides** and **nanoparticles** under conditions to allow hybridization of the **oligonucleotides** on the **nanoparticles** to the linking **oligonucleotides** so that a desired nanomaterial or nanostructure is formed wherein the **nanoparticles** are held together by **oligonucleotide** connectors;

(6) an assembly of containers comprising a first container holding **nanoparticles** having attached **oligonucleotides**; a second container holding **nanoparticles** having attached **oligonucleotides** having a sequence complementary to the sequence of **oligonucleotides** in the first container;

(7) a method of separating a selected nucleic acid having at least two portions from other nucleic acids by providing **two** or more types of **nanoparticles** having attached **oligonucleotides**; and contacting the nucleic acids and **nanoparticles** under conditions effective to allow hybridization of the **oligonucleotides** on the **nanoparticles** on the **nanoparticles** with the selected nucleic acid so that the **nanoparticles** hybridized to the selected nucleic acid **aggregate** and precipitate;

(8) a method of binding **oligonucleotides** to charged **nanoparticles** to produce stable **nanoparticle-oligonucleotide** conjugates by providing **oligonucleotides** having covalently bound to a moiety comprising a functional group which can bind to the **nanoparticles**; contacting the **oligonucleotides** and the **nanoparticles** in water for a period of time to allow at least some of the **oligonucleotides** to bind to the **nanoparticles**; adding salt(s) to the water to form a salt solution, wherein the ionic strength of the salt solution is sufficient to overcome at least partially the electrostatic attraction or repulsion of the **oligonucleotides** for the **nanoparticles** and the electrostatic repulsion of the **oligonucleotides** for each other; and contacting the **oligonucleotides** and **nanoparticles** in the salt solution for an additional period of time sufficient to allow sufficient additional **oligonucleotides** to bind to the **nanoparticles** to produce the stable **nanoparticle-oligonucleotide** conjugates; and

(9) a method of accelerating movement of a nanoparticle to an electrode surface by providing type(s) of nanoparticle bound to a charged first component of a specific binding pair and an electrode surface including a second component of a specific binding pair; contacting the nanoparticle and the surface under conditions effective to allow binding between the first and second components of the specific binding pair; and subjecting the nanoparticle to an electrical field to accelerate movement of the nanoparticle to the surface and facilitate binding between the first and second components of the binding pair.

USE - For detecting nucleic acid, preferably viral RNA or DNA, bacterial DNA, a gene associated with a disease, a fungal DNA, synthetic DNA, synthetic RNA, structurally modified natural or synthetic RNA, structurally modified natural or modified DNA, or a product of a polymerase chain reaction amplification (claimed), for e.g. diagnosis of disease, sequencing of nucleic acids, forensics, paternity testing, cell line authentication, and monitoring gene therapy.

ADVANTAGE - The method of detecting nucleic acids based on observing a color change with the naked eye is cheap, fast, simple, and robust (the reagents are stable). It does not require specialized or expensive equipment. Little or no instrumentation is required.  
Dwg.0/71

2003-237646 [23]; 2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45];  
2003-521746 [49]; 2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56];  
2003-615795 [58]; 2003-634854 [60]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

DNC C2003-225305

TI Detection of nucleic acid useful for, e.g. research and analytical laboratories in deoxyribonucleic acid sequencing, comprises contacting nucleic acid with at least **two** types of **nanoparticles** attached with **oligonucleotides**.

DC B04 D16

IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J; TATON, T A

PA (NANO-N) NANOSPHERE INC

CYC 1

PI US 2003124528 A1 20030703 (200376)\* 130

ADT US 2003124528 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-976601 20011012

FDT US 2003124528 A1 CIP of US 6361944

PRAI US 2001-976601 20011012; US 1996-31809P 19960729;  
WO 1997-US12783 19970721; US 1999-240755 19990129;  
US 1999-344667 19990625; US 2000-200161P 20000426;  
US 2000-603830 20000626

AN 2003-810979 [76] WPIDS

CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22];  
2003-237646 [23]; 2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45];  
2003-521746 [49]; 2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56];  
2003-615795 [58]; 2003-634854 [60]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

AB US2003124528 A UPAB: 20040123

NOVELTY - Detecting a nucleic acid having at least two portions comprising contacting the nucleic acid with at least **two** types of **nanoparticles** attached with **oligonucleotides**, at conditions to allow hybridization of the **oligonucleotides** on the **nanoparticles** with the nucleic acid, and observing a detectable change brought by hybridization of the **oligonucleotides** on the **nanoparticles**, is new.

DETAILED DESCRIPTION - Detecting a nucleic acid having at least two portions comprising:

(a) contacting the nucleic acid with at least **two** types of **nanoparticles** attached with **oligonucleotides**, the **oligonucleotides** of the **two** types of **nanoparticles** each has a sequence complementary to respective portions of the sequence of the nucleic acid, the contacting taking place at conditions to allow hybridization of the **oligonucleotides** on the **nanoparticles** with the nucleic acid; and

(b) observing a detectable change brought by hybridization of the **oligonucleotides** on the **nanoparticles** with the nucleic acid.

INDEPENDENT CLAIMS are also included for:

(1) a kit comprising at least one container holding a composition comprising at least **two** types of **nanoparticles** attached with **oligonucleotides**;

(2) an **aggregate** probe comprising at least **two** types of **nanoparticles** attached with **oligonucleotides**;

(3) a satellite probe comprising a **particle** attached with **oligonucleotides**, and probe **oligonucleotides** hybridized to the **oligonucleotides** attached to the **nanoparticles** and having a reporter molecule attached to one end;

(4) nanofabrication comprising contacting linking

**oligonucleotides** and **nanoparticles** to allow hybridization of the **oligonucleotides** on the **nanoparticles** to the linking **oligonucleotides** so that a desired nanomaterial or nanostructure is formed where the **nanoparticles** are held together by **oligonucleotides** connectors; and

(5) binding **oligonucleotides** to charged **nanoparticles** to produce stable **nanoparticle-oligonucleotide** conjugate, comprising:

(a) contacting the **oligonucleotides** and the **nanoparticles** in water for a period to allow at least some **oligonucleotides** to bind to the **nanoparticles**;

(b) adding at least one salt to the water to form a salt solution, the ionic strength of the salt solution being sufficient to overcome at least partially the electrostatic attraction or repulsion of the **oligonucleotides** for the **nanoparticles** and the electrostatic repulsion of the **oligonucleotides** for each other; and

(c) contacting the **oligonucleotides** and **nanoparticles** in the salt solution for additional period to allow additional **oligonucleotides** to bind to the **nanoparticles** to produce the stable **nanoparticle-oligonucleotide** conjugates.

USE - The method is used for detecting a nucleic acid, e.g. viral RNA or DNA, gene associated with a disease, bacterial DNA, fungal DNA, synthetic DNA or RNA, structurally modified natural or synthetic RNA or DNA, from a biological source, or product of a polymerase chain reaction amplification (claimed). It used for, e.g. research and analytical laboratories in DNA sequencing, in the field to detect the presence of specific pathogens, in the doctor's office for quick identification of an infection to assist in prescribing a drug for treatment, and in homes and health centers for inexpensive first-line screening.

ADVANTAGE - The method of detecting nucleic acids based on observing a color change with the naked eye is cheap, fast, simple, robust (the reagents are stable), do not require specialized or expensive equipment, and little or no instrumentation is required.

Dwg.0/41

L5 ANSWER 6 OF 64 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
AN 2003-615795 [58] WPIDS  
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22];  
2003-237646 [23]; 2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45];  
2003-521746 [49]; 2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]  
DNN N2003-490341 DNC C2003-167921  
TI Detecting nucleic acid having **two** portions, by providing  
**nanoparticles** having **oligonucleotides** attached to it,  
contacting nucleic acid and **nanoparticles** to allow  
hybridization, and observing detectable change.  
DC B04 D16 S03  
IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;  
TATON, T A  
PA (NANO-N) NANOSPHERE INC  
CYC 1  
PI US 2003049630 A1 20030313 (200358)\* 129  
ADT US 2003049630 A1 Provisional US 1996-31809P 19960729, CIP of WO  
1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US  
1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US  
2000-603830 20000626, US 2001-957318 20010920  
FDT US 2003049630 A1 CIP of US 6361944  
PRAI US 2001-957318 20010920; US 1996-31809P 19960729;

WO 1997-US12783            19970721; US 1999-240755            19990129;  
US 1999-344667            19990625; US 2000-200161P            20000426;  
US 2000-603830            20000626

AN 2003-615795 [58]    WPIDS  
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22];  
2003-237646 [23]; 2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45];  
2003-521746 [49]; 2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

AB US2003049630 A UPAB: 20040123  
NOVELTY - Detecting (M1) nucleic acid having **two** portions,  
involving providing **nanoparticles** having  
**oligonucleotides** attached to it, which has a sequence  
complementary to a sequence of **two** portions of nucleic acid,  
contacting nucleic acid and **nanoparticles**, to allow  
hybridization of **oligonucleotides** with **two** or more  
portions of nucleic acid, and observing a detectable change brought about  
by hybridization, is new.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the  
following:

(1) a kit comprising a container holding a composition comprising  
**two** types of **nanoparticles** having  
**oligonucleotides** attached to it, where the  
**oligonucleotides** on the first type of **nanoparticles** have  
a sequence complementary to the sequence of a first portion of a nucleic  
acid, and the **oligonucleotides** on the second type of  
**nanoparticles** have a sequence complementary to the sequence of a  
second portion of the nucleic acid;

(2) an **aggregate** probe comprising at least  
**two** types of **nanoparticles** having  
**oligonucleotides** attached to it, where the **nanoparticles**  
of the **aggregate** probe are bound to each other as a result of  
the hybridization of some of the **oligonucleotides** attached to  
them, and has **oligonucleotides** attached to it which have a  
sequence complementary to a portion of the sequence of a nucleic acid;

(3) a core probe comprising at least **two** types of  
**nanoparticles** having **oligonucleotides** attached to it,  
where the **nanoparticles** are bound to each other as a result of  
hybridization of some of the **oligonucleotides** attached to it;

(4) a substrate having **nanoparticles** attached to it;

(5) a metallic or semiconductor **nanoparticle** having  
**oligonucleotides** attached to it, where the  
**oligonucleotides** are labeled with fluorescent molecules at the  
ends not attached to the nanoparticle;

(6) a satellite probe comprising a **particle** having  
**oligonucleotides** attached to it, and probe  
**oligonucleotides** hybridized to the **oligonucleotides**  
attached to the **nanoparticles**, and having a first portion and a  
second portion, where the first portion has a sequence complementary to  
the sequence of the first portion of **oligonucleotides** attached  
to the **particles**, and both portions have sequences complementary  
to portions of the sequence of the nucleic acid, and the probe  
**oligonucleotide** further has a reporter molecule attached to one  
end;

(7) a composition comprising at least **two** types of  
**nanoparticles** having **oligonucleotides** attached to it;

(8) an assembly of containers comprising first and second containers  
holding **nanoparticles** having **oligonucleotides** attached  
to it, which has a sequence complementary to that of the  
**oligonucleotides** attached to the **nanoparticles** in the  
containers;

(9) a **nanoparticle** (I) having several different

**oligonucleotides** attached to it;

(10) binding (M2) **oligonucleotides** to charged **nanoparticles** to produce stable **nanoparticle-oligonucleotide** conjugates;

(11) **nanoparticle-oligonucleotide** conjugates (II) which are **nanoparticles** having **oligonucleotides** attached to them which are present on the surface of the nanoparticles at a surface density sufficient so that the conjugates are stable and having a sequence complementary to a portion of the sequence of a nucleic acid or another **oligonucleotide**, and a covalently bound cyclic disulfide or polythiol functional group;

(12) nanomaterials (III) or nanostructures composed of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** are held together by **oligonucleotide** connectors; and

(13) a kit for detecting an analyte, comprising a container holding (II), and optional support for observing a detectable change.

USE - M1, (I), (II) and the **aggregate** probe are useful for detecting two or more nucleic acids (from a biological source) having at least two portions, such as viral RNA, bacterial or fungal DNA, a gene associated with a disease, synthetic, or structurally-modified natural or synthetic RNA or DNA, or a product of a polymerase chain reaction amplification. (II) is useful for preparing a nanoprobe conjugate for detecting an analyte, and for detecting a nucleic acid bound to an electrode surface. (I) and (II) are useful for nanofabrication, and for separating a selected nucleic acid having two portions from other nucleic acids (all claimed).

ADVANTAGE - Diagnostic assays employing (II) improve the sensitivity of the assay.

Dwg.0/41

L5 ANSWER 7 OF 64 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
AN 2003-596265 [56] WPIDS  
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22];  
2003-237646 [23]; 2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45];  
2003-521746 [49]; 2003-576420 [54]; 2003-596264 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]  
DNC C2003-161361  
TI Detection of nucleic acid for, e.g. research and analytical laboratories  
in deoxyribonucleic acid sequencing, involves contacting nucleic acid with  
**nanoparticles** having **oligonucleotides**.  
DC B04 D16  
IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;  
TATON, T A  
PA (NANO-N) NANOSPHERE INC  
CYC 1  
PI US 2002182613 A1 20021205 (200356)\* 107  
US 6682895 B2 20040127 (200408)  
ADT US 2002182613 A1 Provisional US 1996-31809P 19960729, CIP of WO  
1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US  
1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US  
2000-603830 20000626, US 2001-976971 20011012; US 6682895 B2 Provisional  
US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US  
1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US  
2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-976971  
20011012  
FDT US 2002182613 A1 CIP of US 6361944; US 6682895 B2 CIP of US 6361944, Cont  
of US 6506564  
PRAI US 2001-976971 20011012; US 1996-31809P 19960729;  
WO 1997-US12783 19970721; US 1999-240755 19990129;  
US 1999-344667 19990625; US 2000-200161P 20000426;

US 2000-603830 20000626

AN 2003-596265 [56] WPIDS

CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
 2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22];  
 2003-237646 [23]; 2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45];  
 2003-521746 [49]; 2003-576420 [54]; 2003-596264 [56]; 2003-615795 [58];  
 2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
 2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

AB US2002182613 A UPAB: 20040202

NOVELTY - Detecting a nucleic acid by contacting nucleic acid with at least **two** types of **nanoparticles** having **oligonucleotides**, to allow hybridization of the **oligonucleotides** on the **nanoparticles**, and observing a detectable change, is new. The **oligonucleotides** on each **nanoparticle** have a sequence complementary to its respective portion of the sequence of the nucleic acid.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for:

(1) a kit comprising container(s) holding a composition comprising at least **two** types of **nanoparticles** having **oligonucleotides**;

(2) an **aggregate** probe comprising at least **two** types of **nanoparticles** having **oligonucleotides**;

(3) a core probe comprising at least **two** types of **nanoparticles** having **oligonucleotides**;

(4) a satellite probe comprising a **particle** having **oligonucleotides**, and probe **oligonucleotides** hybridized to the **oligonucleotides**; and

(5) a method of nanofabrication.

The probe **oligonucleotides** may also have a reporter molecule attached to one end.

USE - For the detection of a nucleic acid used in, e.g. research and analytical laboratories in DNA sequencing, in the field to detect the presence of specific pathogens, in the doctor's office for quick identification of an infection to assist in prescribing a drug for treatment, and in homes and health centers for inexpensive first-line screening.

ADVANTAGE - The inventive method of detecting nucleic acids based on observing a color change with the naked eye are cheap, fast, simple, robust (the reagents are stable), do not require specialized or expensive equipment, and little or no instrumentation is required.

Dwg.0/41

L5 ANSWER 8 OF 64 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2003-596264 [56] WPIDS

CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
 2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22];  
 2003-237646 [23]; 2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45];  
 2003-521746 [49]; 2003-576420 [54]; 2003-596265 [56]; 2003-615795 [58];  
 2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
 2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

DNC C2003-161360

TI Detection of nucleic acid for, e.g. research and analytical laboratories in deoxyribonucleic acid sequencing, involves contacting nucleic acid with **nanoparticles** having **oligonucleotides**.

DC B04 D16

IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;  
 TATON, T A

PA (NANO-N) NANOSPHERE INC

CYC 1

PI US 2002182611 A1 20021205 (200356)\* 109  
 US 6610491 B2 20030826 (200357)

ADT US 2002182611 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-966491 20010928; US 6610491 B2 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-966491 20010928

FDT US 2002182611 A1 CIP of US 6361944; US 6610491 B2 CIP of US 6361944, Cont of US 6506564

PRAI US 2001-966491 20010928; US 1996-31809P 19960729;  
WO 1997-US12783 19970721; US 1999-240755 19990129;  
US 1999-344667 19990625; US 2000-200161P 20000426;  
US 2000-603830 20000626

AN 2003-596264 [56] WPIDS

CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22];  
2003-237646 [23]; 2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45];  
2003-521746 [49]; 2003-576420 [54]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

AB US2002182611 A UPAB: 20040123

NOVELTY - Detecting a nucleic acid by contacting nucleic acid with at least two types of **nanoparticles** having **oligonucleotides**, to allow hybridization of the **oligonucleotides** on the **nanoparticles**, and observing a detectable change, is new. The **oligonucleotides** on each **nanoparticle** have a sequence complementary to its respective portion of the sequence of the nucleic acid.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for:

(1) a kit comprising containers holding a composition comprising at least two types of **nanoparticles** having **oligonucleotides**;

(2) an **aggregate** probe comprising at least two types of **nanoparticles** having **oligonucleotides**;

(3) a **core** probe comprising at least two types of **nanoparticles** having **oligonucleotides**;

(4) a **satellite** probe comprising a **particle** having **oligonucleotides**, and probe **oligonucleotides** hybridized to the **oligonucleotides**;

(5) a method of nanofabrication;

(6) an assembly of containers comprising two container holding **nanoparticles**;

(7) separating a selected nucleic acid having at least two portions from other nucleic acids; and

(8) binding **oligonucleotides** to charged **nanoparticles** to produce stable **nanoparticle-oligonucleotide** conjugates.

USE - For the detection of a nucleic acid used in, e.g. research and analytical laboratories in DNA sequencing, in the field to detect the presence of specific pathogens, in the doctor's office for quick identification of an infection to assist in prescribing a drug for treatment, and in homes and health centers for inexpensive first-line screening.

ADVANTAGE - The method of detecting nucleic acids based on observing a color change with the naked eye are cheap, fast, simple, robust (the reagents are stable), do not require specialized or expensive equipment, and little or no instrumentation is required.

Dwg.0/41

CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22];  
2003-237646 [23]; 2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

DNN N2003-413913 DNC C2003-140191

TI Detection of nucleic acid having -2 portions used to prepare biomaterials  
and in nanofabrication methods, comprises providing nanoparticles,  
contacting nucleic acid and nanoparticles, and observing change.

DC B04 D16 S03

IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;  
TATON, T A

PA (NANO-N) NANOSPHERE INC

CYC 1

PI US 2003044805 A1 20030306 (200349)\* 130

ADT US 2003044805 A1 Provisional US 1996-31809P 19960729, CIP of WO  
1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US  
1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US  
2000-603830 20000626, US 2001-981344 20011015

FDT US 2003044805 A1 CIP of US 6361944

PRAI US 2001-981344 20011015; US 1996-31809P 19960729;  
WO 1997-US12783 19970721; US 1999-240755 19990129;  
US 1999-344667 19990625; US 2000-200161P 20000426;  
US 2000-603830 20000626

AN 2003-521746 [49] WPIDS

CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22];  
2003-237646 [23]; 2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

AB US2003044805 A UPAB: 20040123

NOVELTY - Nucleic acid having at least 2 portions is detected by  
providing type of **nanoparticles** having **oligonucleotides**  
, contacting nucleic acid and **nanoparticles** under conditions  
that allow hybridization of **oligonucleotides** on  
**nanoparticles**, and observing detectable change brought about by  
the hybridization.

DETAILED DESCRIPTION - The detection of nucleic acid having at least  
2 portions involves providing type of **nanoparticles**  
having **oligonucleotides**, contacting the nucleic acid and the  
**nanoparticles** under conditions that allow hybridization of  
**oligonucleotides** on **nanoparticles**, and observing  
detectable change brought about by the hybridization. The  
**oligonucleotides** on each **nanoparticle** have a sequence  
complementary to the sequence of at least 2 portions of the  
nucleic acid.

INDEPENDENT CLAIMS are also included for:

(1) a kit comprising container(s) that holds a composition having at  
least 2 types of **nanoparticles** with an attached  
**oligonucleotides** with the **oligonucleotides** on the first  
type of **nanoparticles** having sequence complementary to that of  
the first portion of the nucleic acid and that of the second type having  
sequence complementary to that of the second portion of the nucleic acid;

(2) an **aggregate** probe comprising at least  
2 types of **nanoparticles** bound to each other as result  
of the hybridization of some of the **oligonucleotides** attached to  
them with the type(s) of **nanoparticles** of the probe having  
attached **oligonucleotides** that have sequence complementary to  
the portion of the sequence of the nucleic acid;

(3) a core probe comprising at least 2 types of

**nanoparticles** having attached **oligonucleotides** with the probe's **nanoparticles** being bound to each other as result of hybridization of some of the **oligonucleotides**;

(4) a substrate having attached **nanoparticles**;

(5) a metallic or semiconductor **nanoparticle** having attached **oligonucleotides** labeled with fluorescent molecules at ends not attached to the **nanoparticle**;

(6) a satellite probe comprising a **particle** having attached **oligonucleotides** with first and second portions both having sequences complementary to portions of the sequence of nucleic acid;

(7) nanofabrication comprising providing linking **oligonucleotide(s)** having selected sequence with at least 2 portions, providing the type(s) of **nanoparticles**, and contacting the linking **oligonucleotides** and the **nanoparticles** under conditions that allow hybridization of the **oligonucleotides** on the **nanoparticles** to the linking **oligonucleotides** so that a desired nanomaterial or nanostructure is formed with the **nanoparticles** held together by **oligonucleotide** connectors;

(8) nanomaterials or nanostructures composed of the **nanoparticles** and held together by the connectors;

(9) a composition comprising the at least 2 types of **nanoparticles**;

(10) an assembly of containers comprising first and second containers holding the **nanoparticles** attached with the **oligonucleotides**;

(11) separating a selected nucleic acid comprising providing the at least 2 types of **nanoparticles** and contacting the nucleic acids and the **nanoparticles** under conditions that allow hybridization of the **oligonucleotides** on the **nanoparticles** with the selected nucleic acid so that the **nanoparticles** hybridized to the selected nucleic acid **aggregate** and precipitate;

(12) binding the **oligonucleotides** to charged **nanoparticles** to produce stable **nanoparticle-oligonucleotide** conjugates comprising providing **oligonucleotides** having covalently bound moiety with functional group that can bind to the **nanoparticles**, contacting the **oligonucleotides** and the **nanoparticles** in water for a time to allow some of the **oligonucleotides** to bind to the **nanoparticles**, adding salt(s) to the water to form salt solution with an ionic strength that overcomes partially electrostatic attraction or repulsion of the **oligonucleotides** for each other and for the **nanoparticles**, and contacting the **oligonucleotides** and the **nanoparticles** in the salt solution for an additional time to allow additional **oligonucleotides** to bind to the **nanoparticles** to produce the stable conjugates; and

(13) **nanoparticle-oligonucleotide** conjugates which are **nanoparticles** having attached **oligonucleotides** at the **particles** surface at a surface density for the conjugates to be stable.

USE - Used for detecting nucleic acids.

ADVANTAGE - The invention can provide highly desirable **nanoparticle-oligonucleotide** conjugates. These conjugates are stable with tailored hybridization abilities.

DESCRIPTION OF DRAWING(S) - The figure is a schematic diagram illustrating formation of **nanoparticle aggregates** by combining **nanoparticles** having attached complementary **oligonucleotides**.

Dwg.1/41

2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22];  
2003-237646 [23]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

DNC C2003-063609

TI Detecting nucleic acid having **two** portions, by providing  
**nanoparticles** having **oligonucleotides** attached to it,  
contacting nucleic acid and **nanoparticles** to allow  
hybridization, and observing detectable change, useful in forensics.

DC B04 D16

IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;  
TATON, T A

PA (NANO-N) NANOSPHERE INC

CYC 1

PI US 2002164605 A1 20021107 (200324)\* 130  
US 6673548 B2 20040106 (200411)

ADT US 2002164605 A1 Provisional US 1996-31809P 19960729, CIP of WO  
1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US  
1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US  
2000-603830 20000626, US 2001-966312 20010928; US 6673548 B2 Provisional  
US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US  
1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US  
2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-966312  
20010928

FDT US 2002164605 A1 CIP of US 6361944; US 6673548 B2 CIP of US 6361944, Cont  
of US 6506564

PRAI US 2001-966312 20010928; US 1996-31809P 19960729;  
WO 1997-US12783 19970721; US 1999-240755 19990129;  
US 1999-344667 19990625; US 2000-200161P 20000426;  
US 2000-603830 20000626

AN 2003-247253 [24] WPIDS

CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22];  
2003-237646 [23]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

AB US2002164605 A UPAB: 20040213  
NOVELTY - Detecting (M1) nucleic acid having **two** portions,  
involves providing **nanoparticles** having **oligonucleotides**  
attached to it, which has a sequence complementary to sequence of  
**two** portions of nucleic acid, contacting nucleic acid and  
**nanoparticles**, to allow hybridization of **oligonucleotides**  
with **two** or more portions of nucleic acid, and observing a  
detectable change brought about by hybridization.  
DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for the  
following:  
(1) a kit comprising a container holding a composition comprising  
**two** types of **nanoparticles** having  
**oligonucleotides** attached to it, where the  
**oligonucleotides** on the first type of **nanoparticles** has  
a sequence complementary to the sequence of a first portion of a nucleic  
acid, and the **oligonucleotides** on the second type of  
**nanoparticles** has a sequence complementary to the sequence of a  
second portion of the nucleic acid;  
(2) an **aggregate** probe comprising at least  
**two** types of **nanoparticles** having  
**oligonucleotides** attached to it, where the **nanoparticles**  
of the **aggregate** probe is bound to each other as a result of the  
hybridization of some of the **oligonucleotides** attached to them,  
and has **oligonucleotides** having attached to it which have a

sequence complementary to a portion of the sequence of a nucleic acid;

(3) a core probe comprising at least **two** types of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** is bound to each other as a result of hybridization of some of the **oligonucleotides** attached to it;

(4) a substrate having nanoparticles attached to it;

(5) a metallic or semiconductor **nanoparticle** having **oligonucleotides** attached to it, where the **oligonucleotides** are labeled with fluorescent molecules at the ends not attached to the nanoparticle;

(6) a satellite probe comprising a **particle** having **oligonucleotides** attached to it, and probe **oligonucleotides** hybridized to the **oligonucleotides** attached to the **nanoparticles**, and having a first portion and a second portion, where the first portion has a sequence complementary to the sequence of the first portion of **oligonucleotides** attached to the **particles**, and both portions have sequences complementary to portions of the sequence of the nucleic acid, and the probe **oligonucleotide** further has a reporter molecule attached to one end;

(7) a composition comprising at least **two** types of **nanoparticles** having **oligonucleotides** attached to it;

(8) an assembly of containers comprising a first and second containers holding **nanoparticles** having **oligonucleotides** attached to it, which has a sequence complementary to that of the **oligonucleotides** attached to the **nanoparticles** in the containers;

(9) a **nanoparticle** (I) having several different **oligonucleotides** attached to it which comprises recognition **oligonucleotides**, each comprising a spacer portion designed so that it is bound to the nanoparticle, and a recognition portion having a sequence complementary to a portion of the sequence of the nucleic acid or another **oligonucleotide**, and optionally a type of diluent **oligonucleotides**;

(10) binding (M2) **oligonucleotides** to charged **nanoparticles** to produce stable **nanoparticle-oligonucleotide** conjugates;

(11) **nanoparticle-oligonucleotide** conjugates (II) which are **nanoparticles** having **oligonucleotides** attached to them which is present on the surface of the nanoparticles at a surface density sufficient so that the conjugates are stable and having a sequence complementary to a portion of the sequence of a nucleic acid or another **oligonucleotide**;

(12) nanomaterials (III) or nanostructures composed of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** are held together by **oligonucleotide** connectors; and

(13) a kit comprising a container holding (I), (II), or the above mentioned substrate.

USE - (M1), (I), (II) and the **aggregate** probe are useful for detecting two or more nucleic acids (from a biological source) having at least two portions, such as viral RNA or DNA, bacterial or fungal DNA, a gene associated with a disease, synthetic, or structurally-modified natural or synthetic RNA or DNA, or a product of a polymerase chain reaction amplification. (I) and (II) are useful for nanofabrication, and for separating a selected nucleic acid having two portions from other nucleic acids (all claimed). (M1) is useful in forensics, DNA sequencing, for paternity testing, cell line authentication, and monitoring gene therapy.

ADVANTAGE - Diagnostic assays employing (II) improve the sensitivity of the assay.

Dwg.0/41

AN 2003-228115 [22] WPIDS

CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-237646 [23];  
2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

DNC C2003-058652

TI Detecting nucleic acids having 2 portions e.g. for detecting  
disease, comprises use of **nanoparticles** which have  
**oligonucleotides** attached to them that are complementary to  
portions of the nucleic acid sequence.

DC B04 D16

IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;  
TATON, T A

PA (NANO-N) NANOSPHERE INC

CYC 1

PI US 2002155461 A1 20021024 (200322)\* 130

ADT US 2002155461 A1 Provisional US 1996-31809P 19960729, CIP of WO  
1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US  
1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US  
2000-603830 20000626, US 2001-976378 20011012

FDT US 2002155461 A1 CIP of US 6361944

PRAI US 2001-976378 20011012; US 1996-31809P 19960729;  
WO 1997-US12783 19970721; US 1999-240755 19990129;  
US 1999-344667 19990625; US 2000-200161P 20000426;  
US 2000-603830 20000626

AN 2003-228115 [22] WPIDS

CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-237646 [23];  
2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

AB US2002155461 A UPAB: 20040123

NOVELTY - Detecting (M1) nucleic acid (NA) having 2 portions comprises:  
(a) providing a type of **nanoparticles** (NP) having  
**oligonucleotides** (O) attached, where (O) on each NP has a sequence  
complementary to a sequence of 2 portions of NA;  
(b) contacting NA and NP to allow hybridization of (O) on NP with two  
or more portions of NA; and  
(c) observing a detectable change brought about by hybridization of  
(O) on NP with NA.

DETAILED DESCRIPTION - Detecting (M1) nucleic acid (NA) having 2  
portions by:  
(a) providing an NP (I) attached to an **oligonucleotide** (O),  
where (O) on each **nanoparticle** has a sequence complementary to a  
sequence of the 2 portions of NA;  
(b) contacting NA and NP to allow hybridization of (O) on NP; and  
(c) observing a detectable change brought about by hybridization.

Detecting NA having 2 portions can be by:  
(i) contacting the NA with 2 types of NP attached to (O), (O) on the  
first type of NP having a sequence complementary to a portion of the  
sequence of the NA, the (O) on the second type of NP having a sequence  
complementary to a second portion of the sequence of the NA, the  
contacting taking place to allow hybridization of the (O) on the NP with  
the NA, and observing a detectable change brought about by hybridization  
of (O) on NP with the NA;  
(ii) providing a substrate attached to an NP, the NP attached to (O),  
the (O) having a sequence complementary to a portion of the sequence of a  
NA to be detected, contacting the NA with the NP attached to the substrate  
to allow hybridization of the (O) on the NP with the NA, providing a

second type of NP having attached **oligonucleotides**, (O) having a sequence complementary to other portion(s) of the sequence of the NA, contacting the NA bound to the substrate with the second type of NP to allow hybridization of the (O) on the second type of NP with the NA and observing a detectable change, where optionally, before carrying the detecting step, a binding **oligonucleotide** having a selected sequence with 2 portions is provided, the first portion being complementary to a portion of the sequence of the (O) on the second type of NP, contacting the binding **oligonucleotide** with the second type of NP bound to the substrate to allow hybridization of the binding **oligonucleotide** to the (O) on the NP, providing a third type of NP having attached (O), the (O) having a sequence complementary to the sequence of a second portion of the binding **oligonucleotide**, contacting the third type of **nanoparticle** with the binding **oligonucleotide** bound to the substrate to allow hybridization of the NP; or

(iii) contacting a NA to be detected with a substrate having (O) attached to it, the (O) having a sequence complementary to a portion of the sequence of the NA, the contacting taking place to allow hybridization of the (O) on the substrate with the NA, contacting the NA bound to the substrate with a type of NP having one or more types of (O) attached to it, one type of the **oligonucleotides** having a sequence complementary to a second portion of the sequence of the NA, the contacting taking place to allow hybridization of the (O) on the NP with the NA, contacting the first type of NP bound to the substrate with a second type of NP having (O) attached to it, the (O) on the second type of NP having a sequence complementary to a portion of the sequence of one of the types of (O) on the first type of NP, the contacting taking place to allow hybridization of the (O) on the first and second types of NP, and observing a detectable change.

INDEPENDENT CLAIMS are also included for the following:

- (1) an **aggregate** probe comprising 2 types of NP attached to it;
- (2) a core probe comprising 2 types of NP having (O) attached to it;
- (3) a substrate attached to NP;
- (4) a metallic or semiconductor NP attached to (O);
- (5) kits and compositions comprising NP;
- (6) nanomaterials and nanostructures comprising nanoparticles and nanofabrication using nanoparticles;
- (7) a satellite probe comprising, a **particle** having attached (O), the (O) having 2 portions, both portions having sequences complementary to portions of the sequence of a nucleic acid, and a probe (O) hybridized to the (O) attached to the **nanoparticles**, the probe (O) having 2 portions, one portion having a sequence complementary to the sequence of the first portion of the (O) attached to the **particles**, both portions having sequences complementary to portions of the sequence of the nucleic acid, the probe (O) having a reporter molecule attached to 1 end;
- (8) an assembly of containers comprising 2 containers having attached (O);
- (9) a NP (I) having several different attached (O);
- (10) separating a selected NA having 2 portions from other NAs using types of NPs having attached (O);
- (11) synthesizing unique NP-(O) conjugates;
- (12) a NP-(O) conjugate produced by (11);
- (13) using the conjugates for detecting NA having 2 portions;
- (14) NP having recognition (O) attached to them;
- (15) NP having (O) attached to them, the (O) comprising a type of recognition (O), each of the types of (O) comprising a sequence complementary to a portion of the sequence of a nucleic acid or another (O);
- (16) a kit comprising a container holding NP-(O) conjugates and NP.

USE - (I) is useful for separating a selected nucleic acid having 2 portions, from other nucleic acids, and for detecting nucleic acids having

2 portions. NP-(O) conjugates are useful for detecting NA having 2 portions. (M1) is useful for detecting nucleic acid having 2 portions (claimed). (M1) is useful for detecting any type of nucleic acids which may be used for diagnosis of disease and in sequencing of nucleic acids. Preferably, the method is useful for detecting nucleic acids for diagnosis and/or monitoring of viral diseases (human immunodeficiency virus, hepatitis virus, herpes virus, cytomegalovirus and Epstein-Barr virus), bacterial diseases, sexually transmitted diseases, inherited disorders, in forensics, in DNA sequencing, for paternity testing, for cell line authentication, for monitoring gene therapy, etc. The method is useful in research and analytical laboratories in DNA sequencing, in the field to detect the presence of specific pathogens, etc.

ADVANTAGE - Detecting nucleic acids based on observing a color change with the naked eye is cheap, fast, simple and robust, and does not require specialized expensive equipment.

DESCRIPTION OF DRAWING(S) - The figure shows a schematic diagram illustrating formation of nanoparticle aggregates by combining nanoparticles having complementary oligonucleotides attached to them, the nanoparticles being held together in aggregates has result of the hybridization of the complementary oligonucleotides.

Dwg.1/41

L5 ANSWER 12 OF 64 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
AN 2003-228114 [22] WPIDS  
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]; 2003-198491 [19]; 2003-228115 [22]; 2003-237646 [23];  
2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]  
DNC C2003-058651  
TI Detecting nucleic acids having 2 portions e.g. for detecting  
disease, comprises use of **nanoparticles** which have  
**oligonucleotides** attached to them that are complementary to  
portions of the nucleic acid sequence.  
DC B04 D16  
IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;  
TATON, T A  
PA (NANO-N) NANOSPHERE INC  
CYC 1  
PI US 2002155459 A1 20021024 (200322)\* 129  
US 6677122 B2 20040113 (200405)  
ADT US 2002155459 A1 Provisional US 1996-31809P 19960729, CIP of WO  
1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US  
1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US  
2000-603830 20000626, US 2001-975062 20011011; US 6677122 B2 Provisional  
US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US  
1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US  
2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-975062  
20011011  
FDT US 2002155459 A1 CIP of US 6361944; US 6677122 B2 CIP of US 6361944, Cont  
of US 6506564  
PRAI US 2001-975062 20011011; US 1996-31809P 19960729;  
WO 1997-US12783 19970721; US 1999-240755 19990129;  
US 1999-344667 19990625; US 2000-200161P 20000426;  
US 2000-603830 20000626  
AN 2003-228114 [22] WPIDS  
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-182627 [18]; 2003-198491 [19]; 2003-228115 [22]; 2003-237646 [23];  
2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];

2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

AB US2002155459 A UPAB: 20040123

NOVELTY - Detecting (M1) nucleic acid (NA) having 2 portions comprises:

- (a) providing **nanoparticles** (NP; I) having **oligonucleotides** (O) attached, where (O) on each NP has a sequence complementary to a sequence of 2 portions of NA;
- (b) contacting NA and NP to allow hybridization of (O) on NP with two or more portions of NA; and
- (c) observing a detectable change brought about by hybridization of (O) on NP with NA.

DETAILED DESCRIPTION - Detecting (M1) nucleic acid (NA) having 2 portions by:

- (a) providing an NP (I) attached to an **oligonucleotide** (O), where (O) on each **nanoparticle** has a sequence complementary to a sequence of the 2 portions of NA;
- (b) contacting NA and NP to allow hybridization of (O) on NP; and
- (c) observing a detectable change brought about by hybridization.

Detecting NA having 2 portions can be by:

- (i) contacting the NA with 2 types of NP attached to (O), (O) on the first type of NP having a sequence complementary to a portion of the sequence of the NA, the (O) on the second type of NP having a sequence complementary to a second portion of the sequence of the NA, the contacting taking place to allow hybridization of the (O) on the NP with the NA, and observing a detectable change brought about by hybridization of (O) on NP with the NA;
- (ii) providing a substrate attached to an NP, the NP attached to (O), the (O) having a sequence complementary to a portion of the sequence of a NA to be detected, contacting the NA with the NP attached to the substrate to allow hybridization of the (O) on the NP with the NA, providing a second type of NP having attached **oligonucleotides**, (O) having a sequence complementary to other portion(s) of the sequence of the NA, contacting the NA bound to the substrate with the second type of NP to allow hybridization of the (O) on the second type of NP with the NA and observing a detectable change, where optionally, before carrying the detecting step, a binding **oligonucleotide** having a selected sequence with 2 portions is provided, the first portion being complementary to a portion of the sequence of the (O) on the second type of NP, contacting the binding **oligonucleotide** with the second type of NP bound to the substrate to allow hybridization of the binding **oligonucleotide** to the (O) on the NP, providing a third type of NP having attached (O), the (O) having a sequence complementary to the sequence of a second portion of the binding **oligonucleotide**, contacting the third type of **nanoparticle** with the binding **oligonucleotide** bound to the substrate to allow hybridization of the NP; or
- (iii) contacting a NA to be detected with a substrate having (O) attached to it, the (O) having a sequence complementary to a portion of the sequence of the NA, the contacting taking place to allow hybridization of the (O) on the substrate with the NA, contacting the NA bound to the substrate with a type of NP having one or more types of (O) attached to it, one type of the **oligonucleotides** having a sequence complementary to a second portion of the sequence of the NA, the contacting taking place to allow hybridization of the (O) on the NP with the NA, contacting the first type of NP bound to the substrate with a second type of NP having (O) attached to it, the (O) on the second type of NP having a sequence complementary to a portion of the sequence of one of the types of (O) on the first type of NP, the contacting taking place to allow hybridization of the (O) on the first and second types of NP, and observing a detectable change.

INDEPENDENT CLAIMS are also included for the following:

- (1) an **aggregate** probe comprising 2 types of NP attached to it;
- (2) a **core** probe comprising 2 types of NP having (O) attached to it;
- (3) a **substrate** attached to NP;

- (4) a metallic or semiconductor NP attached to (O);
- (5) kits and compositions comprising NP;
- (6) nanomaterials and nanostructures comprising nanoparticles and nanofabrication using nanoparticles;
- (7) a satellite probe comprising, a **particle** having attached (O), the (O) having 2 portions, both portions having sequences complementary to portions of the sequence of a nucleic acid, and a probe (O) hybridized to the (O) attached to the **nanoparticles**, the probe (O) having 2 portions, one portion having a sequence complementary to the sequence of the first portion of the (O) attached to the **particles**, both portions having sequences complementary to portions of the sequence of the nucleic acid, the probe (O) having a reporter molecule attached to 1 end;
- (8) an assembly of containers comprising 2 containers having attached (O);
- (9) a NP (I) having several different attached (O);
- (10) separating a selected NA having 2 portions from other NAs using types of NPs having attached (O);
- (11) synthesizing unique NP-(O) conjugates;
- (12) a NP-(O) conjugate produced by (11);
- (13) using the conjugates for detecting NA having 2 portions;
- (14) NP having recognition (O) attached to them;
- (15) NP having (O) attached to them, the (O) comprising a type of recognition (O), each of the types of (O) comprising a sequence complementary to a portion of the sequence of a nucleic acid or another (O); and

(16) a kit comprising a container holding NP-(O) conjugates and NP.  
 USE - (I) is useful for separating a selected nucleic acid having 2 portions, from other nucleic acids, and for detecting nucleic acids having 2 portions. NP-(O) conjugates are useful for detecting NA having 2 portions. (M1) is useful for detecting nucleic acid having 2 portions (claimed). (M1) is useful for detecting any type of nucleic acids which may be used for diagnosis of disease and in sequencing of nucleic acids. Preferably, the method is useful for detecting nucleic acids for diagnosis and/or monitoring of viral diseases (human immunodeficiency virus, hepatitis virus, herpes virus, cytomegalovirus and Epstein-Barr virus), bacterial diseases, sexually transmitted diseases, inherited disorders, in forensics, in DNA sequencing, for paternity testing, for cell line authentication, for monitoring gene therapy, etc. The method is useful in research and analytical laboratories in DNA sequencing, in the field to detect the presence of specific pathogens, etc.

ADVANTAGE - Detecting nucleic acids based on observing a color change with the naked eye is cheap, fast, simple and robust, and does not require specialized expensive equipment.

DESCRIPTION OF DRAWING(S) - The figure shows a schematic diagram illustrating the formation of nanoparticle aggregates by combining nanoparticles having complementary oligonucleotides attached to them.  
 Dwg.1/41

L5 ANSWER 13 OF 64 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
 AN 2003-198491 [19] WPIDS  
 CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
 2003-182627 [18]; 2003-228114 [22]; 2003-228115 [22]; 2003-237646 [23];  
 2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
 2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
 2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
 2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]  
 DNC C2003-050804  
 TI Detecting nucleic acids having at least 2 portions comprises use  
 of **nanoparticles** which have **oligonucleotides** attached  
 to them that are complementary to portions of the nucleic acid sequence.  
 DC B04 D16  
 IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;

TATON, T A  
 PA (NANO-N) NANOSPHERE INC  
 CYC 1  
 PI US 2002155462 A1 20021024 (200319)\* 130  
 US 6720147 B2 20040413 (200425)  
 ADT US 2002155462 A1 Provisional US 1996-31809P 19960729, CIP of WO  
 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US  
 1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US  
 2000-603830 20000626, US 2001-976577 20011012; US 6720147 B2 Provisional  
 US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US  
 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US  
 2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-976577  
 20011012  
 FDT US 2002155462 A1 CIP of US 6361944; US 6720147 B2 CIP of US 6361944, Cont  
 of US 6506564  
 PRAI US 2001-976577 20011012; US 1996-31809P 19960729;  
 WO 1997-US12783 19970721; US 1999-240755 19990129;  
 US 1999-344667 19990625; US 2000-200161P 20000426;  
 US 2000-603830 20000626  
 AN 2003-198491 [19] WPIDS  
 CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
 2003-182627 [18]; 2003-228114 [22]; 2003-228115 [22]; 2003-237646 [23];  
 2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
 2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
 2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
 2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]  
 AB US2002155462 A UPAB: 20040418

NOVELTY - Detecting nucleic acid (NA) having at least 2 portions  
 comprises providing type of **nanoparticles** (NP) having attached  
 to **oligonucleotides** (O) ((O) on each NP has a sequence  
 complementary to sequence of at least 2 portions of NA), contacting NA and  
 NP to allow hybridization of (O) on NP with 2 or more portions of NA, and  
 observing a detectable change brought about by hybridization of (O) on NP  
 with NA.

DETAILED DESCRIPTION - Detecting (M1) nucleic acid (NA) having at  
 least 2 portions by providing a type of NP (I) having  
**oligonucleotide** (O) attached to it ((O) on each  
**nanoparticle** has a sequence complementary to sequence of at least  
 2 portions of NA), contacting NA and NP to allow hybridization of  
 (O) on NP with 2 or more portions of NA, and observing a detectable change  
 brought about by hybridization of the **oligonucleotides** on the NP  
 with the NA.

INDEPENDENT CLAIMS are included for the following:

- (1) an **aggregate** probe comprising at least 2 types of NP  
 having attached to it, where NP are bound to each other as a result of  
 hybridization of some of (O) attached to it, which have:
  - (a) the sequence complementary to a portion of a NA; or
  - (b) a hydrophobic group attached to the end not attached to the NP;
- (2) a core probe comprising at least 2 types of NP having (O)  
 attached to it, the NP of the core probe being bound to each other as a  
 result of the hybridization of some of the (O) attached to them;
- (3) a substrate having NP attached to it;
- (4) a metallic or semiconductor NP having (O) attached to it, where  
 (O) is labeled with fluorescent molecules at the ends not attached to NP;
- (5) kits and compositions comprising the NP;
- (6) nanomaterials and nanostructures comprising nanoparticles and  
 methods of nanofabrication using utilizing nanoparticles;
- (7) a satellite probe comprising , a **particle** having  
 attached **oligonucleotides**, the **oligonucleotides** having  
 a first portion and a second portion, both portions having sequences  
 complementary to portions of the sequence of a nucleic acid, and probe  
**oligonucleotide** hybridized to the **oligonucleotides**  
 attached to the **nanoparticles**, the probe

**oligonucleotides** having a first portion and a second portion, the first portion having a sequence complementary to the sequence of the first portion of the **oligonucleotides** attached to the **particles**, both portions having sequences complementary to portions of the sequence of the nucleic acid, the probe **oligonucleotides** further having a reporter molecule attached to one end;

(8) an assembly of containers comprising first and second containers having attached (O), and (O) attached to NP having a sequence complementary to (O) attached to NP, in the containers;

(9) a NP (I) having several different attached (O);

(10) separating a selected NA having at least 2 portions from other NAs using 2 or more types of NPs having attached (O);

(11) methods of synthesizing unique NP-(O) conjugates;

(12) NP-(O) conjugate produced by the methods;

(13) methods of using the conjugates for detecting NA having at least 2 portions;

(14) NP having **oligonucleotides** attached to them, the **oligonucleotides** comprising at least one type of recognition **oligonucleotides**, each of the recognition **oligonucleotides** comprising a spacer portion and a recognition portion, the spacer portion being designed so that it is bound to the NP, the recognition portion having a sequence complementary to at least one portion of the sequence of a nucleic acid or another **oligonucleotide**;

(15) NP having **oligonucleotides** attached to them, the **oligonucleotides** comprising:

(a) at least one type of recognition **oligonucleotides**, each of the types or recognition **oligonucleotides** comprising a sequence complementary to at least one portion of the sequence of a nucleic acid or another **oligonucleotide**; and

(b) a type of diluent **oligonucleotides**; and

(16) a kit comprising a container holding NP-(O) conjugates and NP as described above.

USE - (I) is useful for separating a selected nucleic acid having at least 2 portions, from other nucleic acids, and for detecting nucleic acids having at least 2 portions. The NP-(O) conjugates are useful for detecting NA having at least 2 portions. (M1) is useful for detecting nucleic acid having at least 2 portions (claimed). (M1) is useful for detecting any type of nucleic acids which may be used for diagnosis of disease and in sequencing of nucleic acids. Preferably, the method is useful for detecting nucleic acids for diagnosis and/or monitoring of viral diseases (human immunodeficiency virus, hepatitis virus, herpes virus, cytomegalovirus and Epstein-Barr virus), bacterial diseases, sexually transmitted diseases, inherited disorders, in forensics, in DNA sequencing, for paternity testing, for cell line authentication, for monitoring gene therapy, etc. The method is useful in research and analytical laboratories in DNA sequencing, in the field to detect the presence of specific pathogens, etc.

ADVANTAGE - Detecting nucleic acids based on observing a color change with the naked eye is cheap, fast, simple and robust, and do not require specialized expensive equipment.

DESCRIPTION OF DRAWING(S) - The figure shows schematic diagram illustrating formation of **nanoparticle aggregates** by combining **nanoparticles** having complementary **oligonucleotides** attached to them, the **nanoparticles** being held together in **aggregates** has result of the hybridization of the complementary **oligonucleotides**.  
Dwg.1/41

2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

DNC C2003-048104

TI Detecting nucleic acids having at least **two** portions involves  
use of **nanoparticles** which have **oligonucleotides**  
attached to them that are complementary to portions of the nucleic acid  
sequence.

DC B04 D16

IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;  
TATON, T A

PA (NANO-N) NANOSPHERE INC

CYC 1

PI US 2002155458 A1 20021024 (200318)\* 130  
US 6740491 B2 20040525 (200435)

ADT US 2002155458 A1 Provisional US 1996-31809P 19960729, CIP of WO  
1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US  
1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US  
2000-603830 20000626, US 2001-967409 20010928; US 6740491 B2 Provisional  
US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US  
1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US  
2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-967409  
20010928

FDT US 2002155458 A1 CIP of US 6361944; US 6740491 B2 CIP of US 6361944, Cont  
of US 6506564

PRAI US 2001-967409 20010928; US 1996-31809P 19960729;  
WO 1997-US12783 19970721; US 1999-240755 19990129;  
US 1999-344667 19990625; US 2000-200161P 20000426;  
US 2000-603830 20000626

AN 2003-182627 [18] WPIDS

CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];  
2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22]; 2003-237646 [23];  
2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

AB US2002155458 A UPAB: 20040603

NOVELTY - Detecting (M1) nucleic acid (NA) having at least **two**  
portions involves providing type of **nanoparticles** (NP) attached  
to **oligonucleotides** (O), where (O) on each NP has a sequence  
complementary to sequence of at least two portions of NA, contacting NA  
and NP to allow hybridization of (O) on NP with two or more portions of  
NA, and observing a detectable change brought about by hybridization of  
(O) on NP with NA.

DETAILED DESCRIPTION - Detecting (M1) NA having at least two portions  
can optionally be carried out any of the following methods:

(a) contacting the NA with at least two types of NP having (O)  
attached to it, (O) on the first type of NP having a sequence  
complementary to a first portion of the sequence of the NA, the (O) on the  
second type of NP having a sequence complementary to a second portion of  
the sequence of the NA, the contacting taking place to allow hybridization  
of the (O) on the NP with the NA, and observing a detectable change  
brought about by hybridization of (O) on NP with the NA;

(b) providing a substrate having a first type of NP attached to it,  
the NP having attached to (O), the (O) having a sequence complementary to  
a first portion of the sequence of a NA to be detected, contacting the NA  
with the NP attached to the substrate under conditions effective to allow  
hybridization of the (O) on the NP with the NA, providing a second type of  
NP having attached **oligonucleotides**, (O) having a sequence  
complementary to one or more other portions of the sequence of the NA,  
contacting the NA bound to the substrate with the second type of NP to  
allow hybridization of the (O) on the second type of NP with the NA and

observing a detectable change. Optionally, before carrying the detecting step, the method involves providing a binding **oligonucleotide** having a selected sequence having at least two portions, the first portion being complementary to at least a portion of the sequence of the (O) on the second type of NP, contacting the binding **oligonucleotide** with the second type of NP bound to the substrate to allow hybridization of the binding **oligonucleotide** to the (O) on the NP, providing a third type of NP having attached (O), the (O) having a sequence complementary to the sequence of a second portion of the binding **oligonucleotide**, contacting the third type of **nanoparticle** with the binding **oligonucleotide** bound to the substrate to allow hybridization of the NP; and

(c) contacting a NA to be detected with a substrate having (O) attached to it, the (O) having a sequence complementary to a first portion of the sequence of the NA, the contacting taking place to allow hybridization of the (O) on the substrate with the NA, contacting the NA bound to the substrate with a first type of NP having one or more types of (O) attached to it, at least one of the types of **oligonucleotides** having a sequence complementary to a second portion of the sequence of the NA, the contacting taking place to allow hybridization of the (O) on the NP with the NA, contacting the first type of NP bound to the substrate with a second type of NP having (O) attached to it, the (O) on the second type of NP having a sequence complementary to at least a portion of the sequence of one of the type of (O) on the first type of NP, the contacting taking place to allow hybridization of the (O) on the first and second types of NP, and observing a detectable change.

INDEPENDENT CLAIMS are included for the following:

- (1) an **aggregate** probe comprising at least two types of NP having attached to it, where NP are bound to each other as a result of hybridization of some of (O) attached to it, which have the sequence complementary to a portion of a NA or a hydrophobic group attached to the end not attached to the NP;
- (2) a core probe comprising at least two types of NP having (O) attached to it, the NP of the core probe being bound to each other as a result of the hybridization of some of the (O) attached to them;
- (3) a substrate having NP attached to it;
- (4) a metallic or semiconductor NP having (O) attached to it, where (O) is labeled with fluorescent molecules at the ends not attached to NP;
- (5) kits and compositions comprising the NP;
- (6) nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication using utilizing nanoparticles;
- (7) a satellite probe comprising a **particle** having attached **oligonucleotides**;
- (8) an assembly of containers comprising first and second containers having attached (O), and (O) attached to NP having a sequence complementary to (O) attached to NP, in the containers;
- (9) a NP (I) having several different attached (O);
- (10) separating a selected NA having at least two portions from other NAs using two or more types of NPs having attached (O);
- (11) methods of synthesizing unique NP-(O) conjugates; NP-(O) conjugate produced by the methods;
- (12) methods of using the conjugates for detecting NA having at least two portions;
- (13) NP having **oligonucleotides** attached to them;
- (14) a kit comprising a container holding NP-(O) conjugates and NP as described above.

USE - (I) is useful for separating a selected nucleic acid having at least two portions, from other nucleic acids, and for detecting nucleic acids having at least two portions. The NP-(O) conjugates are useful for detecting NA having at least two portions. (M1) is useful for detecting nucleic acid having at least two portions (claimed). (M1) is useful for detecting any type of nucleic acids which may be used for diagnosis of disease and in sequencing of nucleic acids. Preferably, the method is useful for detecting nucleic acids for diagnosis and/or monitoring of

viral diseases (human immunodeficiency virus, hepatitis virus, herpes virus, cytomegalovirus and Epstein-Barr virus), bacterial diseases, sexually transmitted diseases, inherited disorders, in forensics, in DNA sequencing, for paternity testing, for cell line authentication, and for monitoring gene therapy. The method is useful in research and analytical laboratories in DNA sequencing, in the field to detect the presence of specific pathogens.

ADVANTAGE - Detecting nucleic acids based on observing a color change with the naked eye is cheap, fast, simple and robust, and does not require specialized expensive equipment.

DESCRIPTION OF DRAWING(S) - The figure shows schematic diagram illustrating formation of **nanoparticle aggregates** by combining **nanoparticles** having complementary **oligonucleotides** attached to them, the **nanoparticles** being held together in **aggregates** has result of the hybridization of the complementary **oligonucleotides**.  
Dwg.1/41

L5 ANSWER 15 OF 64 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
AN 2003-174167 [17] WPIDS  
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-182627 [18];  
2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22]; 2003-237646 [23];  
2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]  
DNC C2003-045481  
TI Detecting nucleic acid having **two** portions, by providing  
**nanoparticles** having **oligonucleotides** attached to it,  
contacting nucleic acid and **nanoparticles** to allow  
hybridization, and observing detectable change.  
DC B04 D16  
IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;  
TATON, T A  
PA (NANO-N) NANOSPHERE INC  
CYC 1  
PI US 2002146720 A1 20021010 (200317)\* 132  
US 6582921 B2 20030624 (200343)  
ADT US 2002146720 A1 Provisional US 1996-31809P 19960729, CIP of WO  
1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US  
1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US  
2000-603830 20000626, US 2001-961949 20010920; US 6582921 B2 Provisional  
US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US  
1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US  
2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-961949  
20010920  
FDT US 2002146720 A1 CIP of US 6361944; US 6582921 B2 CIP of US 6361944  
PRAI US 2001-961949 20010920; US 1996-31809P 19960729;  
WO 1997-US12783 19970721; US 1999-240755 19990129;  
US 1999-344667 19990625; US 2000-200161P 20000426;  
US 2000-603830 20000626  
AN 2003-174167 [17] WPIDS  
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-182627 [18];  
2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22]; 2003-237646 [23];  
2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]  
AB US2002146720 A UPAB: 20040123  
NOVELTY - Detecting (M1) nucleic acid having **two** portions,  
comprising providing **nanoparticles** having  
**oligonucleotides** attached to it, which has a sequence

complementary to sequence of **two** portions of nucleic acid, contacting nucleic acid and **nanoparticles**, to allow hybridization of **oligonucleotides** with portions of nucleic acid, and observing a detectable change brought about by hybridization, is new.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

- (1) an **aggregate** probe comprising at least **two** types of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** of the **aggregate** probe is bound to each other as a result of the hybridization of some of the **oligonucleotides** attached to them, and has **oligonucleotides** having attached to it which have a sequence complementary to a portion of the sequence of a nucleic acid;
- (2) a core probe comprising at least **two** types of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** is bound to each other as a result of hybridization of some of the **oligonucleotides** attached to it;
- (3) a kit comprising a container holding a composition comprising **two** types of **nanoparticles** having **oligonucleotides** attached to it, where the **oligonucleotides** on the first type of **nanoparticles** has a sequence complementary to the sequence of a first portion of a nucleic acid, and the **oligonucleotides** on the second type of **nanoparticles** has a sequence complementary to the sequence of a second portion of the nucleic acid, and also comprising the core probe;
- (4) a substrate having nanoparticles attached to it;
- (5) a metallic or semiconductor **nanoparticle** having **oligonucleotides** attached to it, where the **oligonucleotides** are labeled with fluorescent molecules at the ends not attached to the nanoparticle;
- (6) a satellite probe comprising a **particle** having **oligonucleotides** attached to it, and probe **oligonucleotides** hybridized to the **oligonucleotides** attached to the **nanoparticles**, and having a first portion and a second portion, where the first portion has a sequence complementary to the sequence of the first portion of **oligonucleotides** attached to the **particles**, and both portions has sequences complementary to portions of the sequence of the nucleic acid, and the probe **oligonucleotide** further has a reporter molecule attached to one end;
- (7) a composition comprising at least **two** types of **nanoparticles** having **oligonucleotides** attached to it;
- (8) an assembly of containers comprising a first and second containers holding **nanoparticles** having **oligonucleotides** attached to it, which has a sequence complementary to that of the **oligonucleotides** attached to the **nanoparticles** in the containers;
- (9) a **nanoparticle** (I) having several different **oligonucleotides** attached to it which comprises recognition **oligonucleotides**, each comprising a spacer portion designed so that it is bound to the nanoparticle, and a recognition portion having a sequence complementary to a portion of the sequence of the nucleic acid or another **oligonucleotide**, and optionally a type of diluent **oligonucleotides**;
- (10) binding (M2) **oligonucleotides** to charged **nanoparticles** to produce stable **nanoparticle-oligonucleotide** conjugates;
- (11) **nanoparticle-oligonucleotide** conjugates (II) which are **nanoparticles** having **oligonucleotides** attached to them which is present on the surface of the nanoparticles at a surface density sufficient so that the conjugates are stable and having a sequence complementary to a portion of the sequence of a nucleic acid or another **oligonucleotide**, and a covalently bound cyclic disulfide or polythiol functional group;

(12) **oligonucleotides** having a covalently bound cyclic disulfide or polythiol functional group that can bind to the nanoparticles;

(13) a **nanoparticle** conjugate for detecting an analyte, comprising **nanoparticles** having **oligonucleotides** bound to it, and **oligonucleotide** having bound to it a specific binding complement of an analyte having a sequence that is complementary to a portion of the **oligonucleotides** bound to the **nanoparticles** and are bound, as a result of hybridization, and a linker **oligonucleotide** having two portions;

(14) nonmaterials (III) or nanostructures composed of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** are held together by **oligonucleotide** connectors;

(15) a kit for detecting an analyte, comprising a container holding (II), and optional support for observing a detectable change; and

(16) a nanomaterial produced, by providing linking **oligonucleotide** comprising two portions, two types of **nanoparticles** having **oligonucleotides** attached to it, and a complex comprised of streptavidin or avidin bound to two or more biotin molecules, each having an **oligonucleotide** bound to the biotin molecule, which has a sequence that is complementary to the second portion of the linking **oligonucleotide**, and contacting the first and second types of **nanoparticles**, the linking **oligonucleotides** and the complex, to allow hybridization of the **oligonucleotides** on the **nanoparticles** to each other and to the linking **oligonucleotide** and the hybridization of the **oligonucleotide** of the complexes to the linking **oligonucleotides** so that a desired nanomaterials or nanostructures is formed.

USE - M1, (I), (II) and the **aggregate** probe are useful for detecting two or more nucleic acids (from a biological source) having at least two portions, such as viral RNA, bacterial or fungal DNA, a gene associated with a disease, synthetic, or structurally-modified natural or synthetic RNA or DNA, or a product of a polymerase chain reaction amplification. (II) is useful for preparing a nanoprobe conjugate for detecting an analyte, and for detecting a nucleic acid bound to an electrode surface. (I) and (II) are useful for fabrication, and for separating a selected nucleic acid having two portions from other nucleic acids. (I), (II) and the **aggregate** probe are useful for detecting an analyte (especially polyvalent analyte) in a sample. (All claimed.)

ADVANTAGE - Diagnostic assays employing (II) improve the sensitivity of the assay.

Dwg.0/41

L5 ANSWER 16 OF 64 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
AN 2002-608256 [65] WPIDS  
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18];  
2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22]; 2003-237646 [23];  
2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]  
DNC C2002-171859  
TI Detecting nucleic acid having two portions, by providing  
**nanoparticles** having **oligonucleotides** attached to it,  
contacting nucleic acid and **nanoparticles** to allow  
hybridization, and observing detectable change.  
DC B04 D16  
IN ELGHANIAN, R; GARIMELLA, V; LETSINGER, R L; LI, Z; MIRKIN, C A; MUCIC, R  
C; PARK, S; STORHOFF, J J; TATON, T A  
PA (NANO-N) NANOSPHERE INC; (ELGH-I) ELGHANIAN R; (GARI-I) GARIMELLA V;

(LETS-I) LETSINGER R L; (LIZZ-I) LI Z; (MIRK-I) MIRKIN C A; (MUCI-I) MUCIC R C; (PARK-I) PARK S; (STOR-I) STORHOFF J J; (TATO-I) TATON T A

CYC 99

PI WO 2002046472 A2 20020613 (200265)\* EN 442  
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ  
NL OA PT SD SE SL SZ TR TZ UG ZM ZW  
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK  
DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR  
KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PH PL PT RO  
RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW  
AU 2002030593 A 20020618 (200266)  
US 2002172953 A1 20021121 (200279)  
EP 1356109 A2 20031029 (200379) EN  
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
RO SE SI TR

ADT WO 2002046472 A2 WO 2001-US46418 20011207; AU 2002030593 A AU 2002-30593  
20011207; US 2002172953 A1 Provisional US 1996-31809P 19960729, CIP of WO  
1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US  
1999-344667 19990625, Provisional US 2000-176409P 20000113, Provisional US  
2000-192699P 20000328, Provisional US 2000-200161P 20000426, CIP of US  
2000-603830 20000626, Provisional US 2000-224631P 20000811, Provisional US  
2000-254392P 20001208, Provisional US 2000-255235P 20001211, CIP of US  
2001-760500 20010112, CIP of US 2001-820279 20010328, US 2001-927777  
20010810; EP 1356109 A2 EP 2001-990826 20011207, WO 2001-US46418 20011207  
FDT AU 2002030593 A Based on WO 2002046472; US 2002172953 A1 CIP of US  
6361944; EP 1356109 A2 Based on WO 2002046472

PRAI US 2001-927777 20010810; US 2000-254392P 20001208;  
US 2000-254418P 20001208; US 2000-255235P 20001211;  
US 2000-255236P 20001211; US 2001-760500 20010112;  
US 2001-820279 20010328; US 2001-282640P 20010409;  
US 1996-31809P 19960729; WO 1997-US12783 19970721;  
US 1999-240755 19990129; US 1999-344667 19990625;  
US 2000-176409P 20000113; US 2000-192699P 20000328;  
US 2000-200161P 20000426; US 2000-603830 20000626;  
US 2000-224631P 20000811

AN 2002-608256 [65] WPIDS  
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];  
2002-258024 [30]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18];  
2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22]; 2003-237646 [23];  
2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

AB WO 200246472 A UPAB: 20040123  
NOVELTY - Detecting (M1) nucleic acid having **two** portions,  
involves providing **nanoparticles** having **oligonucleotides**  
attached to it, which has a sequence complementary to sequence of  
**two** portions of nucleic acid, contacting nucleic acid and  
**nanoparticles**, to allow hybridization of **oligonucleotides**  
with **two** or more portions of nucleic acid, and observing a  
detectable change brought about by hybridization.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) a kit comprising a container holding a composition comprising  
**two** types of **nanoparticles** having  
**oligonucleotides** attached to it, where the  
**oligonucleotides** on the first type of **nanoparticles** has  
a sequence complementary to the sequence of a first portion of a nucleic  
acid, and the **oligonucleotides** on the second type of  
**nanoparticles** has a sequence complementary to the sequence of a  
second portion of the nucleic acid;

(2) an **aggregate** probe comprising at least  
**two** types of **nanoparticles** having  
**oligonucleotides** attached to it, where the **nanoparticles**

of the **aggregate** probe is bound to each other as a result of the hybridization of some of the **oligonucleotides** attached to them, and has **oligonucleotides** having attached to it which have a sequence complementary to a portion of the sequence of a nucleic acid;

(3) a core probe comprising at least **two** types of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** is bound to each other as a result of hybridization of some of the **oligonucleotides** attached to it;

(4) a substrate having **nanoparticles** attached to it;

(5) a metallic or semiconductor **nanoparticle** having **oligonucleotides** attached to it, where the **oligonucleotides** are labeled with fluorescent molecules at the ends not attached to the nanoparticle;

(6) a satellite probe comprising a **particle** having **oligonucleotides** attached to it, and probe **oligonucleotides** hybridized to the **oligonucleotides** attached to the **nanoparticles**, and having a first portion and a second portion, where the first portion has a sequence complementary to the sequence of the first portion of **oligonucleotides** attached to the **particles**, and both portions has sequences complementary to portions of the sequence of the nucleic acid, and the probe **oligonucleotide** further has a reporter molecule attached to one end;

(7) a composition comprising at least **two** types of **nanoparticles** having **oligonucleotides** attached to it;

(8) an assembly of containers comprising a first and second containers holding **nanoparticles** having **oligonucleotides** attached to it, which has a sequence complementary to that of the **oligonucleotides** attached to the **nanoparticles** in the containers;

(9) a **nanoparticle** (I) having several different **oligonucleotides** attached to it which comprises recognition **oligonucleotides**, each comprising a spacer portion designed so that it is bound to the nanoparticle, and a recognition portion having a sequence complementary to a portion of the sequence of the nucleic acid or another **oligonucleotide**, and optionally a type of diluent **oligonucleotides**;

(10) binding (M2) **oligonucleotides** to charged **nanoparticles** to produce stable **nanoparticle-oligonucleotide** conjugates;

(11) **nanoparticle-oligonucleotide** conjugates (II) which are **nanoparticles** having **oligonucleotides** attached to them which is present on the surface of the nanoparticles at a surface density sufficient so that the conjugates are stable and having a sequence complementary to a portion of the sequence of a nucleic acid or another **oligonucleotide**, and a covalently bound cyclic disulfide or polythiol functional group;

(12) **oligonucleotides** having a covalently bound cyclic disulfide or polythiol functional group that can bind to the nanoparticles;

(13) a **nanoparticle** conjugate for detecting an analyte, comprising **nanoparticles** having **oligonucleotides** bound to it, and **oligonucleotide** having bound to it a specific binding complement of an analyte having a sequence that is complementary to a portion of the **oligonucleotides** bound to the **nanoparticles** and are bound, as a result of hybridization, and a linker **oligonucleotide** having two portions;

(14) nonmaterials (III) or nanostructures composed of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** are held together by **oligonucleotide** connectors;

(15) a kit for detecting an analyte, comprising a container holding (II), and optional support for observing a detectable change;

(16) a nanomaterial produced, by providing linking

oligonucleotide comprising two portions, two types of nanoparticles having oligonucleotides attached to it, and a complex comprised of streptavidin or avidin bound to two or more biotin molecules, each having an oligonucleotide bound to the biotin molecule, which has a sequence that is complementary to the second portion of the linking oligonucleotide, and contacting the first and second types of nanoparticles, the linking oligonucleotides and the complex, to allow hybridization of the oligonucleotides on the nanoparticles to each other and to the linking oligonucleotide and the hybridization of the oligonucleotide of the complexes to the linking oligonucleotides so that a desired nanomaterials or nanostructures is formed; and

(17) accelerating movement of a nanoparticle to an electrode surface.

USE - (M1), (I), (II) and the aggregate probe are useful for detecting two or more nucleic acids (from a biological source) having at least two portions, such as viral RNA, bacterial or fungal DNA, a gene associated with a disease, synthetic, or structurally-modified natural or synthetic RNA or DNA, or a product of a polymerase chain reaction amplification. (II) is useful for preparing a nanoprobe conjugate for detecting an analyte, and for detecting a nucleic acid bound to an electrode surface. (I) and (II) are useful for fabrication, and for separating a selected nucleic acid having two portions from other nucleic acids. (I), (II) and the aggregate probe are useful for detecting an analyte (especially polyvalent analyte) in a sample (all claimed).

ADVANTAGE - Diagnostic assays employing (II) improve the sensitivity of the assay.

Dwg.0/67

L5 ANSWER 17 OF 64 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
AN 2001-451868 [48] WPIDS  
CR 1998-145263 [13]; 2001-061976 [07]; 2001-656926 [75]; 2002-258024 [30];  
2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18];  
2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22]; 2003-237646 [23];  
2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]  
DNC C2001-136537  
TI Detecting a nucleic acid useful in e.g. diagnosing genetic, bacterial or  
viral diseases, by contacting the nucleic acid with  
oligonucleotides attached to nanoparticles and having  
sequences complementary a portion of the nucleic acid.  
DC B04 D16  
IN ELGHANIAN, R; GARIMELLA, V; LETSINGER, R L; LI, Z; MIRKIN, C A; MUCIC, R  
C; STORHOFF, J J; TATON, T A  
PA (NANO-N) NANOSPHERE INC; (ELGH-I) ELGHANIAN R; (GARI-I) GARIMELLA V;  
(LETS-I) LETSINGER R L; (LIZZ-I) LI Z; (MIRK-I) MIRKIN C A; (MUCI-I) MUCIC  
R C; (STOR-I) STORHOFF J J; (TATO-I) TATON T A  
CYC 95  
PI WO 2001051665 A2 20010719 (200148)\* EN 229  
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ  
NL OA PT SD SE SL SZ TR TZ UG ZW  
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM  
DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC  
LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE  
SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW  
AU 2001032795 A 20010724 (200166)  
US 2002127574 A1 20020912 (200262)  
US 2002155442 A1 20021024 (200277)  
US 6506564 B1 20030114 (200313)  
EP 1294930 A2 20030326 (200323) EN  
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT

RO SE SI TR

US 2003054358 A1 20030320 (200323)

US 2003059777 A1 20030327 (200325)

US 2003143538 A1 20030731 (200354)

US 6645721 B2 20031111 (200382)

JP 2004501340 W 20040115 (200410) 735

US 6720411 B2 20040413 (200425)

ADT WO 2001051665 A2 WO 2001-US1190 20010112; AU 2001032795 A AU 2001-32795 20010112; US 2002127574 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-973788 20011010; US 2002155442 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-176409P 20000113, Provisional US 2000-200161P 20000426, Provisional US 2000-213906P 20000626, US 2001-760500 20010112; US 6506564 B1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-200161P 20000426, US 2000-603830 20000626; EP 1294930 A2 EP 2001-904855 20010112, WO 2001-US1190 20010112; US 2003054358 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-975376 20011011; US 2003059777 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-957313 20010920; US 2003143538 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-975059 20011011; US 6645721 B2 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990625, Provisional US 2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-973788 20011010

FDT AU 2001032795 A Based on WO 2001051665; US 2002127574 A1 CIP of US 6361944; US 2002155442 A1 CIP of US 6361944; EP 1294930 A2 Based on WO 2001051665; US 2003054358 A1 CIP of US 6361944; US 2003059777 A1 CIP of US 6361944; US 2003143538 A1 CIP of US 6361944, Cont of US 6506564; US 6645721 B2 CIP of US 6361944, Cont of US 6506564; JP 2004501340 W Based on WO 2001051665; US 6720411 B2 CIP of US 6361944, Cont of US 6506564

PRAI US 2001-760500 20010112; US 2000-176409P 20000113; US 2000-200161P 20000426; US 2000-603830 20000626; US 1996-31809P 19960729; WO 1997-US12783 19970721; US 1999-240755 19990129; US 1999-344667 19990625; US 2001-973788 20011010; US 2000-213906P 20000626; US 2001-975376 20011011; US 2001-957313 20010920; US 2001-975059 20011011

AN 2001-451868 [48] WPIDS

CR 1998-145263 [13]; 2001-061976 [07]; 2001-656926 [75]; 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18]; 2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22]; 2003-237646 [23]; 2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49]; 2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58]; 2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82]; 2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

AB WO 200151665 A UPAB: 20040418

NOVELTY - Detecting a nucleic acid having at least 2 portions, comprises contacting the nucleic acid with one or more types of **nanoparticles** having **oligonucleotides** attached to the

**nanoparticles** and having sequences complementary to portions of the sequence of the nucleic acid.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) methods of detecting a nucleic acid having at least 2 portions comprising:

(a) contacting the nucleic acid with one or more types of **nanoparticles** having **oligonucleotides** attached to the **nanoparticles** and having sequences complementary to portions of the sequence of the nucleic acid, under conditions allowing the hybridization of the **oligonucleotides** on the **nanoparticles** with the nucleic acid; and

(b) observing a detectable change brought about by hybridization of the **oligonucleotides** on the **nanoparticles** with the nucleic acid;

(2) kits comprising at least one container holding a composition containing at least 2 types of **nanoparticles** having **oligonucleotides** attached to it, where the first type has a sequence complementary to the sequence of a first portion of a nucleic acid, and the **oligonucleotides** on the second type of **nanoparticles** has a sequence complementary to the sequence of a second portion of the nucleic acid;

(3) an **aggregate** probe comprising at least 2 types of **nanoparticles** having **oligonucleotides** attached to it, the **nanoparticles** of the **aggregate** probe are bound to each other as a result of the hybridization of some of the **oligonucleotides** attached to them, and at least one of the **nanoparticles** of the **aggregate** probe having **oligonucleotides** attached to it which have a hydrophobic group on the end not attached to the **nanoparticles**;

(4) a kit comprising a container holding a core probe having at least 2 types of **nanoparticles** having **oligonucleotides** attached to it and the **nanoparticles** of the core probe is bound to each other as a result of the hybridization of some of the **oligonucleotides** attached to them;

(5) a core probe comprising at least 2 types of **nanoparticles** having **oligonucleotides** attached to it;

(6) a substrate having **nanoparticles** attached to it;

(7) a metallic or semiconductor **nanoparticle** having **oligonucleotides** attached to it which are labeled with fluorescent molecule at the end not attached to the **nanoparticle**;

(8) a satellite probe comprising a **particle** having attached **oligonucleotides**, and probe **oligonucleotides** hybridized to the **oligonucleotides** attached to the **nanoparticles**;

(9) methods of nanofabrication;

(10) nanomaterials or nanostructures composed of **nanoparticles** having **oligonucleotides** attached to it and being held by **oligonucleotide** connectors;

(11) a composition comprising at least 2 types of **nanoparticles** having **oligonucleotides** attached to it;

(12) an assembly of containers holding **nanoparticles** having **oligonucleotides** attached to them;

(13) a **nanoparticle** having multiple **oligonucleotides** attached to it;

(14) a method of separating a selected nucleic acid having at least 2 portions from other nucleic acid;

(15) methods of binding **oligonucleotides** to charged **nanoparticles** to produce stable **nanoparticle-oligonucleotide** conjugates;

(16) **nanoparticle-oligonucleotide** conjugates which are **nanoparticles** having **oligonucleotides** attached to them, where the **oligonucleotides** are present on the surface of the **nanoparticles** at a surface density sufficient so that the conjugates are stable, and at least some of the

**oligonucleotides** have sequences complementary to at least one portion of the nucleic acid or **oligonucleotide** sequence;

(17) **nanoparticles** having **oligonucleotides** attached to them which comprises at least one type of recognition **oligonucleotides** having a sequence complementary to a portion of the nucleic acid sequence, and a type of diluent **oligonucleotides**; and

(18) methods of detecting a nucleic acid.

USE - The methods are useful for detecting nucleic acids, natural or synthetic, and modified or unmodified. The methods may also be applied in the diagnosis of genetic, bacterial and viral diseases, in forensics, in DNA sequencing, for paternity testing, for cell line authentication, and for monitoring gene therapy. The methods are further useful in research and analytical laboratories in DNA sequencing, in the field to detect the presence of specific pathogens, for quick identification of an infection to assist in drug prescription, and in homes and health centers for inexpensive first-line screening.

ADVANTAGE - The methods, which are based on observing color change with the naked eye, are cheap, fast, simple, robust (reagents are stable), do not require specialized or expensive equipment, and little or no instrumentation is required.

Dwg.0/46

L5 ANSWER 18 OF 64 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
AN 2001-061976 [07] WPIDS  
CR 1998-145263 [13]; 2001-451868 [48]; 2001-656926 [75]; 2002-258024 [30];  
2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18];  
2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22]; 2003-237646 [23];  
2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]  
DNC C2001-017349  
TI Detecting nucleic acid, useful for e.g. diagnosis of diseases, forensics  
and DNA sequencing, comprises observing detectable change brought about by  
hybridization of nucleic acid with substrate or **particle** bound  
**oligonucleotides**.  
DC B04 D16  
IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;  
TATON, T A  
PA (ELGH-I) ELGHANIAN R; (LETS-I) LETSINGER R L; (MIRK-I) MIRKIN C A;  
(MUCI-I) MUCIC R C; (STOR-I) STORHOFF J J; (TATO-I) TATON T A  
CYC 94  
PI WO 2001000876 A1 20010104 (200107)\* EN 139  
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ  
NL OA PT SD SE SL SZ TZ UG ZW  
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM  
DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC  
LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE  
SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW  
AU 2000056378 A 20010131 (200124)  
EP 1198591 A1 20020424 (200235) EN  
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
RO SE SI  
JP 2003503699 W 20030128 (200309) 232  
ADT WO 2001000876 A1 WO 2000-US17507 20000626; AU 2000056378 A AU 2000-56378  
20000626; EP 1198591 A1 EP 2000-941713 20000626, WO 2000-US17507 20000626;  
JP 2003503699 W WO 2000-US17507 20000626, JP 2001-506866 20000626  
FDT AU 2000056378 A Based on WO 2001000876; EP 1198591 A1 Based on WO  
2001000876; JP 2003503699 W Based on WO 2001000876  
PRAI US 2000-200161P 20000426; US 1999-344667 19990625  
AN 2001-061976 [07] WPIDS  
CR 1998-145263 [13]; 2001-451868 [48]; 2001-656926 [75]; 2002-258024 [30];  
2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18];

2003-198491 [19]; 2003-228114 [22]; 2003-228115 [22]; 2003-237646 [23];  
2003-247253 [24]; 2003-430409 [40]; 2003-479398 [45]; 2003-521746 [49];  
2003-576420 [54]; 2003-596264 [56]; 2003-596265 [56]; 2003-615795 [58];  
2003-634854 [60]; 2003-810979 [76]; 2003-863931 [80]; 2003-897536 [82];  
2004-059018 [06]; 2004-059019 [06]; 2004-059020 [06]; 2004-059754 [06]

AB WO 200100876 A UPAB: 20040123

NOVELTY - Detecting a nucleic acid with at least 2 portions (NA) comprising hybridizing the NA with **oligonucleotides** attached to a substrate and/or **particle** and detecting a change in color, conductivity or optical density, is new.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) an **aggregate** probe (I) containing at least 2 types of containing at least 2 types of NP with attached ON that have a sequence complementary to a portion of the NA sequence;

(2) an **aggregate** probe (II) containing at least 2 types of containing at least 2 types of NP with attached ON that have a hydrophobic group attached to the end;

(3) a core probe (III) containing at least 2 types of NP with attached ON, where the NP are bound together as a result of the hybridization of the ON attached to them;

(4) detecting (M1) NA comprising:

(a) hybridizing NA with a substrate attached to ON located between a pair of electrodes, which have a sequence complementary to portion 1 of the NA;

(b) hybridizing the substrate bound NA with an **aggregate** probe which contains nanoparticles (NP) that conduct electricity and have at least one of the types of ON attached that have a sequence complementary to portion 2; and

(c) detecting a change in conductivity;

(5) detecting (M2) NA comprising:

(a) hybridizing

(i) a substrate attached to ON;

(ii) (I) or (II) containing at least 2 types of NP with attached ON that have a sequence complementary to portion 1 of the NA; and

(iii) a type of NP having at least 2 types of attached ON where the first has a sequence complementary to portion 2 of the NA and the second type has a sequence complementary to a portion of the ON sequence attached to the substrate; and

(b) observing a detectable change;

(6) detecting (M3) NA comprising:

(a) hybridizing NA with a substrate attached to ON;

(b) hybridizing the substrate bound NA with liposomes (LP) with attached ON having a sequence complementary to a portion of the NA sequence;

(c) hybridizing the LP bound to substrate with (II); and

(d) observing detectable change;

(7) detecting (M4) NA comprising:

(a) hybridizing:

(i) a substrate attached to ON;

(ii) (III) containing at least 2 types of NP with attached ON that have a sequence complementary to portion 1 of the NA; and

(iii) a type of linking **oligonucleotide** containing a sequence complementary to portion 2 of NA and a sequence complementary to a portion of the ON sequence attached to the NP of (III); and

(b) observing a detectable change;

(8) binding (M5) ON to charged NP to produce stable NP-ON conjugates which have ON at a surface density of at least 10 picomoles/cm<sup>2</sup> on the NP surface comprising:

(a) providing ON covalently bound to a moiety containing a functional group which can bind to the NP;

(b) contacting the ON and the NP in salt water where the ionic strength is sufficient to partially overcome the electrostatic attraction or repulsion of the ON for each other or for the NP; and

- (c) allow sufficient ON to bind to the NP to produce the NP-ON conjugates;
- (9) NP-ON conjugates (IV) which have ON at a surface density of at least 10 picomoles/cm<sup>2</sup> on the NP surface;
- (10) detecting (M6) NA comprising:
- (a) hybridizing NA with at least 1 type of (IV) having the first type with a sequence complementary to portion 1 of NA and the second type having a sequence complementary to portion 2 of NA; and
- (b) observing a detectable change brought about by the hybridization of the ON on the NP with NA;
- (11) detecting (M7) NA comprising:
- (a) hybridizing substrate bound NA with (IV) having a sequence complementary to portion 2 of NA; and
- (b) observing a detectable change;
- (12) detecting (M8) NA on a substrate comprising detecting the presence and/or quantity of NA with an optical scanner;
- (13) nanofabrication (M9) comprising hybridizing at least one type of linking ON having at least 2 portions and one or more types of (IV) having a sequence complementary to a portion of a linking ON, to produce a nanomaterial or nanostructure where the NP of (IV) are held together by ON connectors;
- (14) nanofabrication (M10.) comprising hybridizing 2 types of (IV) where the ON of the first type of (IV) have a sequence complementary to the ON of the second type of (IV), to produce a nanomaterial of nanostructure;
- (15) nanomaterials or nanostructures (V) composed of (IV) held together by ON connectors;
- (16) separating a selected NA having at least 2 portions from other NA comprising hybridizing NA with 2 or more types of (IV) where the ON of (IV) have a sequence complementary to a portion of the selected NA, so that (IV) hybridized with the selected NA aggregate and precipitate; and
- (17) kits for detecting nucleic acids.

USE - The new methods are useful for detecting nucleic acids, such as, for the diagnosis and/or monitoring of diseases (e.g. viral diseases, bacterial diseases, sexually transmitted diseases, inherited disorders and cancers), in forensics, in DNA sequencing, for paternity testing, for cell line authentication and for monitoring gene therapy.

ADVANTAGE - Detecting nucleic acids based upon observing a color change, e.g. with the naked eye, is cheap, fast, simple, robust as the reagents are stable, do not require specialized or expensive equipment, and little or no instrumentation is required. The nanoparticle oligonucleotide conjugates remain stable for at least 6 months. They are also highly selective and specific as the temperature range over which they form is quite narrow. A single base mismatch and as little as 20 femtomoles (fM) of target can be detected using the conjugates. This points towards a potential method for detecting oligonucleotide targets without the need for target amplification schemes such as polymerase chain reaction.

To evaluate the effectiveness of nanoparticles as colorimetric indicators for oligonucleotide arrays, test chips were probed with a synthetic target and labeled with both fluorophore and nanoparticle indicators. Arrays challenged with the model target and nanoparticle labeled probes and stained with a silver amplification solution showed highly selective hybridization to complementary array elements. Redundant spots of the same capture sequence showed reproducible and consistent hybridization signal. No background adsorption by nanoparticles or silver stain was observed. The darker spots corresponding to adenine at position 8 indicate that oligonucleotide target hybridized preferentially to perfectly complementary capture strands over mismatched ones by a more than 3:1 ratio. In comparison, fluorophore labels only provided 2:1 selectivity for adenine at position 8. Nanoparticle labeled probes were significantly more sensitive than those using fluorophore labeled probes. Hybridization signal could be resolved at target concentrations as low as 50 fM in comparison to Cy3/Cy5 fluorophore labeled arrays for which 1 pM

or greater target concentrations are required.  
Dwg.0/44

L5 ANSWER 19 OF 64 USPATFULL on STN  
AN 2004:144556 USPATFULL  
TI **Nanoparticles** having **oligonucleotides** attached  
thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES  
Garimella, Viswanadham, Evanston, IL, UNITED STATES  
Li, Zhi, Evanston, IL, UNITED STATES  
PA Nanosphere, Inc. (U.S. corporation)  
PI US 2004110220 A1 20040610  
AI US 2003-716829 A1 20031118 (10)  
RLI Division of Ser. No. US 2001-760500, filed on 12 Jan 2001, PENDING  
Continuation-in-part of Ser. No. US 2000-603830, filed on 26 Jun 2000,  
GRANTED, Pat. No. US 6506564 Continuation-in-part of Ser. No. US  
1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944  
Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999,  
ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21  
Jul 1997, PENDING  
PRAI US 2000-176409P 20000113 (60)  
US 2000-213906P 20000626 (60)  
US 2000-200161P 20000426 (60)  
US 1996-31809P 19960729 (60)  
DT Utility  
FS APPLICATION  
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF LLP, 300 S. WACKER DRIVE, 32ND  
FLOOR, CHICAGO, IL, 60606  
CLMN Number of Claims: 485  
ECL Exemplary Claim: 1  
DRWN 52 Drawing Page(s)  
LN.CNT 8748  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
AB The invention provides methods of detecting a nucleic acid. The methods  
comprise contacting the nucleic acid with one or more types of  
**particles** having **oligonucleotides** attached thereto. In  
one embodiment of the method, the **oligonucleotides** are  
attached to **nanoparticles** and have sequences complementary to  
portions of the sequence of the nucleic acid. A detectable change  
(preferably a color change) is brought about as a result of the  
hybridization of the **oligonucleotides** on the  
**nanoparticles** to the nucleic acid. The invention also provides  
compositions and kits comprising **particles**. The invention  
further provides methods of synthesizing unique **nanoparticle-**  
**oligonucleotide** conjugates, the conjugates produced by the  
methods, and methods of using the conjugates. In addition, the invention  
provides nanomaterials and nanostructures comprising nanoparticles and  
methods of nanofabrication utilizing nanoparticles. Finally, the  
invention provides a method of separating a selected nucleic acid from  
other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 20 OF 64 USPATFULL on STN  
AN 2004:133353 USPATFULL  
TI Method of detection by enhancement of silver staining  
IN Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Garimella, Viswanadham, Evanston, IL, UNITED STATES  
PA Northwestern University (U.S. corporation)

PI US 2004101889 A1 20040527  
AI US 2003-633878 A1 20030804 (10)  
RLI Continuation of Ser. No. US 2001-903461, filed on 11 Jul 2001, GRANTED,  
Pat. No. US 6602669  
PRAI US 2000-217782P 20000711 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 30  
ECL Exemplary Claim: 1  
DRWN 5 Drawing Page(s)  
LN.CNT 562  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
AB The present invention relates to a method for amplifying a detection  
signal by enhancing or promoting the deposition of additional silver in  
assay detection systems where the formation of a silver spot serves as a  
reporter for the presence of a target molecule, including biological  
polymers (e.g., proteins and nucleic acids) and small molecules.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 21 OF 64 USPATFULL on STN  
AN 2004:126877 USPATFULL  
TI Method for attachment of silylated molecules to glass surfaces  
IN Garimella, Viswanadham, Evanston, IL, UNITED STATES  
Bernal, Yasmith, Lake Zurich, IL, UNITED STATES  
PA Nanosphere, Inc. (U.S. corporation)  
PI US 2004096856 A1 20040520  
AI US 2003-447073 A1 20030528 (10)  
PRAI US 2002-383564P 20020528 (60)  
DT Utility  
FS APPLICATION  
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF LLP, 300 S. WACKER DRIVE, 32ND  
FLOOR, CHICAGO, IL, 60606  
CLMN Number of Claims: 90  
ECL Exemplary Claim: 1  
DRWN 9 Drawing Page(s)  
LN.CNT 1655  
AB A method for the efficient immobilization of silylated molecules such as  
silylated **oligonucleotides** or proteins onto unmodified  
surfaces such as a glass surface is provided. Also provided are  
compounds, devices, and kits for modifying surfaces such as glass  
surfaces.

L5 ANSWER 22 OF 64 USPATFULL on STN  
AN 2004:114058 USPATFULL  
TI Nanoparticle probes with Raman Spectroscopic fingerprints for analyte  
detection  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Cao, Yunwei, Gainesville, FL, UNITED STATES  
Jin, Rongchao, Evanston, IL, UNITED STATES  
PI US 2004086897 A1 20040506  
AI US 2003-431341 A1 20030507 (10)  
RLI Continuation-in-part of Ser. No. US 2002-172428, filed on 14 Jun 2002,  
PENDING  
PRAI US 2002-378538P 20020507 (60)  
US 2002-383630P 20020528 (60)  
DT Utility  
FS APPLICATION  
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE  
3200, CHICAGO, IL, 60606  
CLMN Number of Claims: 89

ECL Exemplary Claim: 1  
DRWN 28 Drawing Page(s)  
LN.CNT 2375

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention encompasses reagents comprising **particles** with at least one Raman dye and a specific binding members bound thereto and methods of using such reagents. The invention also encompasses reagents of a specific binding member and two or more different Raman dyes and methods for using such reagents. New types of **particle** probes having a specific binding member bound thereto are described. These reagents are used in a novel detection strategy that utilizes the catalytic properties of the Au nanoparticles to generate a silver coating that can behave as a surface-enhanced Raman scattering (SERS) promoter for the dye-labeled **particles** that have been captured by target and an underlying chip in microarray format. The strategy provides the high sensitivity and high selectivity attributes of grey-scale scanometric detection but provides a route to multiplexing and ratioing capabilities since a very large number of probes can be designed based upon the concept of using a Raman tag as a spectroscopic fingerprint in detection. These spectra are used as fingerprints to differentiate **oligonucleotide** or other targets in one solution. This method has been used to distinguish six dissimilar DNA targets with six Raman labeled **nanoparticle** probes, and also **two** RNA targets with single nucleotide polymorphisms (SNPs).

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 23 OF 64 USPATFULL on STN  
AN 2004:94779 USPATFULL  
TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Bloomington, IN, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES  
Garimella, Viswanadham, Evanston, IL, UNITED STATES  
Li, Zhi, Evanston, IL, UNITED STATES  
Park, So-Jung, Austin, TX, UNITED STATES  
PA Nanosphere, Inc. (U.S. corporation)  
PI US 2004072231 A1 20040415  
AI US 2003-640618 A1 20030813 (10)  
RLI Division of Ser. No. US 2001-820279, filed on 28 Mar 2001, PENDING  
Continuation-in-part of Ser. No. US 2001-760500, filed on 12 Jan 2001,  
PENDING Continuation-in-part of Ser. No. US 2000-603830, filed on 26 Jun  
2000, GRANTED, Pat. No. US 6506564 Continuation-in-part of Ser. No. US  
1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944  
Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999,  
ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21  
Jul 1997, PENDING  
PRAI US 2000-255235P 20001211 (60)  
US 2000-254392P 20001208 (60)  
US 2000-192699P 20000328 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 570  
ECL Exemplary Claim: 1  
DRWN 63 Drawing Page(s)  
LN.CNT 11118

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles

having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 24 OF 64 USPATFULL on STN  
AN 2004:76679 USPATFULL  
TI Functionalized nanoparticles  
IN Huang, Xueying, Hockessin, DE, UNITED STATES  
Zheng, Ming, Wilmington, DE, UNITED STATES  
PI US 2004058457 A1 20040325  
AI US 2003-630262 A1 20030730 (10)  
PRAI US 2002-406736P 20020829 (60)  
DT Utility  
FS APPLICATION  
LREP E I DU PONT DE NEMOURS AND COMPANY, LEGAL PATENT RECORDS CENTER, BARLEY  
MILL PLAZA 25/1128, 4417 LANCASTER PIKE, WILMINGTON, DE, 19805  
CLMN Number of Claims: 34  
ECL Exemplary Claim: 1  
DRWN 4 Drawing Page(s)  
LN.CNT 1576

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A functionalized nanoparticle is provided. The nanoparticle is comprised of a nanoparticle coated with a monolayer to which a bifunctional peptide is attached. The peptide is functionalized to bind various biopolymers including DNA and RNA. The functionalized nanoparticle is useful in the capture of biopolymers and for the programmed assembly of nanometer scale electronic devices.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 25 OF 64 USPATFULL on STN  
AN 2004:50835 USPATFULL  
TI Fractal dimension analysis of nanoparticle **aggregates** using angle dependent light scattering for the detection and characterization of nucleic acids and proteins  
IN Souza, Glauco R., Raleigh, NC, UNITED STATES  
Miller, J. Houston, Barnesville, MD, UNITED STATES  
PI US 2004038264 A1 20040226  
AI US 2003-436621 A1 20030513 (10)  
PRAI US 2002-380507P 20020514 (60)  
DT Utility  
FS APPLICATION  
LREP CRAIG G. COCHENOUR, ESQ., BUCHANAN INGERSOLL, P.C., ONE OXFORD CENTRE, 20th FLOOR, 301 GRANT STREET, PITTSBURGH, PA, 15219  
CLMN Number of Claims: 36  
ECL Exemplary Claim: 1  
DRWN 22 Drawing Page(s)  
LN.CNT 1505

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB This invention provides an apparatus and method that employs angle dependent light scattering combined with fractal dimension analysis of nanoparticle **aggregates** of gold and biopolymers, such as

protein and nucleic acids, for detection and structural and functional characterization of unknown biopolymers. This is accomplished by detecting ADLS signal changes resulting from Au-biopolymer **aggregate** formation or from changes in fractal structure of Au-biopolymer **aggregates** as they specifically interact with other biopolymers. This invention describes an angle dependent light scattering apparatus that provides a sensitive, non-destructive, and dynamic measurement of the fractal dimension of Au-biopolymer **aggregates**, and provides a means for interpreting those measurements to allow identification of unknown nucleotides. A scattering cell is also provided.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 26 OF 64 USPATFULL on STN  
AN 2004:50826 USPATFULL  
TI Non-alloying core shell nanoparticles  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Cao, Yun-Wei, Evanston, IL, UNITED STATES  
Jin, Rongchao, Evanston, IL, UNITED STATES  
PA Northwestern University (U.S. corporation)  
PI US 2004038255 A1 20040226  
AI US 2003-397579 A1 20030326 (10)  
RLI Division of Ser. No. US 2001-34451, filed on 28 Dec 2001, PENDING  
PRAI US 2001-293861P 20010525 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 35  
ECL Exemplary Claim: 1  
DRWN 7 Drawing Page(s)  
LN.CNT 1088

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The present invention relates composite core/shell **nanoparticles** and a **two**-step method for their preparation. The present invention further relates to biomolecule-core/shell nanoparticle conjugates and methods for their preparation. The invention also relates to methods of detection of biomolecules comprising the biomolecule or specific binding substance-core/shell nanoparticle conjugates.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 27 OF 64 USPATFULL on STN  
AN 2004:18804 USPATFULL  
TI Electrical detection of DNA hybridization and specific binding events  
IN Patno, Timothy, Evanston, IL, UNITED STATES  
Khoury, Christopher, Chicago, IL, UNITED STATES  
PA Nanosphere, Inc., Northbrook, IL (U.S. corporation)  
PI US 2004014106 A1 20040122  
AI US 2003-437753 A1 20030514 (10)  
PRAI US 2002-380441P 20020514 (60)  
DT Utility  
FS APPLICATION  
LREP Edward K. Runyan, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300  
S. Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 77  
ECL Exemplary Claim: 1  
DRWN 10 Drawing Page(s)  
LN.CNT 1112

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A method for detecting a target analyte having a first binding site and a second binding site. A substrate is provided having at least a first and a second patterned conductor, the first conductor being separated

from the second conductor. The arrangement of the patterned conductors forms at least two substantially non-conducting gaps. The method may also include contacting to the substrate capture probes that bind specifically to the first binding site of the target analyte and providing electrically conductive nanoparticles having bound thereto binding sites that bind specifically to the second binding site of the target analyte. Then, contacting the substrate and the electrically conductive nanoparticles with the target analyte under hybridizing conditions will bind the target analyte to the substrate and to the electrically conductive nanoparticles. The electrically conductive nanoparticles between the conductors can thus be electrically detected. Detection can be improved by silver deposition of the nanoparticles.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 28 OF 64 USPATFULL on STN  
AN 2003:300265 USPATFULL  
TI Nanoparticle probs with Raman spectroscopic fingerprints for analyte detection  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Cao, Yunwei, Evanston, IL, UNITED STATES  
Jin, Rongchao, Evanston, IL, UNITED STATES  
PA Northwestern University, Evanston, IL, UNITED STATES, 60208 (U.S. corporation)  
PI US 2003211488 A1 20031113  
AI US 2002-172428 A1 20020614 (10)  
PRAI US 2002-378538P 20020507 (60)  
US 2002-383630P 20020528 (60)  
DT Utility  
FS APPLICATION  
LREP MCDONNELL BOEHNNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE 3200, CHICAGO, IL, 60606  
CLMN Number of Claims: 23  
ECL Exemplary Claim: 1  
DRWN 25 Drawing Page(s)  
LN.CNT 1904

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention encompasses reagents comprising **particles** with at least one Raman dye and a specific binding members bound thereto and methods of using such reagents. The invention also encompasses reagents of a specific binding member and two or more different Raman dyes and methods for using such reagents.

New types of **particle** probes having a specific binding member bound thereto are described. These reagents are used in a novel detection strategy that utilizes the catalytic properties of the Au nanoparticles to generate a silver coating that can behave as a surface-enhanced Raman scattering (SERS) promoter for the dye-labeled **particles** that have been captured by target and an underlying chip in microarray format. The strategy provides the high sensitivity and high selectivity attributes of grey-scale scanometric detection but provides a route to multiplexing and ratioing capabilities since a very large number of probes can be designed based upon the concept of using a Raman tag as a spectroscopic fingerprint in detection. These spectra are used as fingerprints to differentiate **oligonucleotide** or other targets in one solution. This method has been used to distinguish six dissimilar DNA targets with six Raman labeled **nanoparticle** probes, and also **two** RNA targets with single nucleotide polymorphisms (SNPs).

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 29 OF 64 USPATFULL on STN  
AN 2003:257732 USPATFULL

TI     **Nanoparticles** having **oligonucleotides** attached  
thereto and uses therefor  
IN     Mirkin, Chad A., Wilmette, IL, UNITED STATES  
       Letsinger, Robert L., Bloomington, IN, UNITED STATES  
       Mucic, Robert C., Glendale, CA, UNITED STATES  
       Storhoff, James J., Evanston, IL, UNITED STATES  
       Elghanian, Robert, Skokie, IL, UNITED STATES  
       Taton, Thomas Andrew, Little Canada, MN, UNITED STATES  
PA     Nanosphere, Inc. (U.S. corporation)  
PI     US 2003180783         A1     20030925  
AI     US 2003-410324         A1     20030409 (10)  
RLI    Continuation of Ser. No. US 2001-961949, filed on 20 Sep 2001, GRANTED,  
       Pat. No. US 6582921 Continuation of Ser. No. US 2000-603830, filed on 26  
       Jun 2000, GRANTED, Pat. No. US 6506564 Continuation-in-part of Ser. No.  
       US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944  
       Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999,  
       ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21  
       Jul 1997, PENDING  
PRAI   US 1996-31809P         19960729 (60)  
DT     Utility  
FS     APPLICATION  
LREP   Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
       Wacker Drive, Chicago, IL, 60606  
CLMN   Number of Claims: 431  
ECL    Exemplary Claim: 1  
DRWN   31 Drawing Page(s)  
LN.CNT 8062

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB     The invention provides methods of detecting a nucleic acid. The methods  
       comprise contacting the nucleic acid with one or more types of  
       **particles** having **oligonucleotides** attached thereto. In  
       one embodiment of the method, the **oligonucleotides** are  
       attached to **nanoparticles** and have sequences complementary to  
       portions of the sequence of the nucleic acid. A detectable change  
       (preferably a color change) is brought about as a result of the  
       hybridization of the **oligonucleotides** on the  
       **nanoparticles** to the nucleic acid. The invention also provides  
       compositions and kits comprising **particles**. The invention  
       further provides methods of synthesizing unique **nanoparticle-**  
       **oligonucleotide** conjugates, the conjugates produced by the  
       methods, and methods of using the conjugates. In addition, the invention  
       provides nanomaterials and nanostructures comprising nanoparticles and  
       methods of nanofabrication utilizing nanoparticles. Finally, the  
       invention provides a method of separating a selected nucleic acid from  
       other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5     ANSWER 30 OF 64   USPATFULL on STN  
AN     2003:237907   USPATFULL  
TI     Compositions and methods for the therapy and diagnosis of colon cancer  
IN     King, Gordon E., Shoreline, WA, UNITED STATES  
       Meagher, Madeleine Joy, Seattle, WA, UNITED STATES  
       Xu, Jiangchun, Bellevue, WA, UNITED STATES  
       Secrist, Heather, Seattle, WA, UNITED STATES  
       Jiang, Yuqiu, Kent, WA, UNITED STATES  
PA     Corixa Corporation, Seattle, WA, UNITED STATES, 98104 (U.S. corporation)  
PI     US 2003166064         A1     20030904  
AI     US 2002-99926         A1     20020314 (10)  
RLI    Continuation-in-part of Ser. No. US 2001-33528, filed on 26 Dec 2001,  
       PENDING Continuation-in-part of Ser. No. US 2001-920300, filed on 31 Jul  
       2001, PENDING  
PRAI   US 2001-302051P         20010629 (60)  
       US 2001-279763P         20010328 (60)

US 2000-223283P      20000803 (60)  
DT      Utility  
FS      APPLICATION  
LREP      SEED INTELLECTUAL PROPERTY LAW GROUP PLLC, 701 FIFTH AVE, SUITE 6300,  
         SEATTLE, WA, 98104-7092  
CLMN      Number of Claims: 17  
ECL      Exemplary Claim: 1  
DRWN      No Drawings  
LN.CNT 8531

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB      Compositions and methods for the therapy and diagnosis of cancer, particularly colon cancer, are disclosed. Illustrative compositions comprise one or more colon tumor polypeptides, immunogenic portions thereof, polynucleotides that encode such polypeptides, antigen presenting cell that expresses such polypeptides, and T cells that are specific for cells expressing such polypeptides. The disclosed compositions are useful, for example, in the diagnosis, prevention and/or treatment of diseases, particularly colon cancer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5      ANSWER 31 OF 64    USPATFULL on STN  
AN      2003:213644    USPATFULL  
TI      **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor  
IN      Mirkin, Chad A., Wilmette, IL, UNITED STATES  
         Letsinger, Robert L., Wilmette, IL, UNITED STATES  
         Mucic, Robert C., Glendale, CA, UNITED STATES  
         Storhoff, James J., Evanston, IL, UNITED STATES  
         Elghanian, Robert, Skokie, IL, UNITED STATES  
         Taton, Thomas A., Little Canada, MN, UNITED STATES  
PA      Nanosphere, Inc. (U.S. corporation)  
PI      US 2003148282      A1    20030807  
AI      US 2001-976968      A1    20011012 (9)  
RLI      Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, GRANTED, Pat. No. US 6506564 Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED  
         Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, PENDING  
PRAI      US 1996-31809P      19960729 (60)  
         US 2000-200161P      20000426 (60)

DT      Utility  
FS      APPLICATION  
LREP      Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606  
CLMN      Number of Claims: 431  
ECL      Exemplary Claim: 1  
DRWN      46 Drawing Page(s)  
LN.CNT 8043

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB      The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of **particles** having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising **particles**. The invention further provides methods of synthesizing unique **nanoparticle-oligonucleotide** conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention

provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 32 OF 64 USPATFULL on STN  
AN 2003:207246 USPATFULL  
TI Real-time monitoring of PCR amplification using nanoparticle probes  
IN Storhoff, James J., Evanston, IL, UNITED STATES  
Fritz, Brett, Chicago, IL, UNITED STATES  
Herrmann, Mark, Clinton, UT, UNITED STATES  
PI US 2003143604 A1 20030731  
AI US 2002-306630 A1 20021127 (10)  
PRAI US 2001-334644P 20011130 (60)  
DT Utility  
FS APPLICATION  
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE  
3200, CHICAGO, IL, 60606  
CLMN Number of Claims: 91  
ECL Exemplary Claim: 1  
DRWN 12 Drawing Page(s)  
LN.CNT 2116

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The present invention relates to the use of nanoparticle detection probes to monitor amplification reactions, especially polymerase chain reactions ("PCR"). More specifically, the present invention involves the use of **nanoparticles oligonucleotide** conjugates treated with a protective agent such as bovine serum albumin in an homogeneous assay format in order to quantitatively and qualitatively detect a target polynucleotide.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 33 OF 64 USPATFULL on STN  
AN 2003:207240 USPATFULL  
TI Bioconjugate-nanoparticle probes  
IN Garimella, Viswanadham, Evanston, IL, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
PI US 2003143598 A1 20030731  
AI US 2002-291291 A1 20021108 (10)  
PRAI US 2001-348239P 20011109 (60)  
DT Utility  
FS APPLICATION  
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE  
3200, CHICAGO, IL, 60606  
CLMN Number of Claims: 99  
ECL Exemplary Claim: 1  
DRWN 9 Drawing Page(s)  
LN.CNT 1472

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides nanoparticle-bioconjugate probes that are useful for detecting target analytes such as nucleic acids. The probes of the invention are stable towards heat and resistant to displacement by thiol containing compounds such as DTT (dithiothreitol).

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 34 OF 64 USPATFULL on STN  
AN 2003:207180 USPATFULL  
TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES

Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES

PA Nanosphere, Inc. (U.S. corporation)

PI US 2003143538 A1 20030731

AI US 2001-975059 A1 20011011 (9)

RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, GRANTED,  
Pat. No. US 6506564 Continuation-in-part of Ser. No. US 1999-344667,  
filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part  
of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED  
Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997,  
PENDING

PRAI US 1996-31809P 19960729 (60)

US 2000-200161P 20000426 (60)

DT Utility

FS APPLICATION

LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 431

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 8062

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods  
comprise contacting the nucleic acid with one or more types of  
**particles** having **oligonucleotides** attached thereto. In  
one embodiment of the method, the **oligonucleotides** are  
attached to **nanoparticles** and have sequences complementary to  
portions of the sequence of the nucleic acid. A detectable change  
(preferably a color change) is brought about as a result of the  
hybridization of the **oligonucleotides** on the  
**nanoparticles** to the nucleic acid. The invention also provides  
compositions and kits comprising **particles**. The invention  
further provides methods of synthesizing unique **nanoparticle-**  
**oligonucleotide** conjugates, the conjugates produced by the  
methods, and methods of using the conjugates. In addition, the invention  
provides nanomaterials and nanostructures comprising nanoparticles and  
methods of nanofabrication utilizing nanoparticles. Finally, the  
invention provides a method of separating a selected nucleic acid from  
other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 35 OF 64 USPATFULL on STN

AN 2003:187818 USPATFULL

TI Non-alloying core shell nanoparticles

IN Mirkin, Chad A., Wilmette, IL, UNITED STATES

Cao, Yun-Wei, Evanston, IL, UNITED STATES

Jin, Rongchao, Evanston, IL, UNITED STATES

PI US 2003129608 A1 20030710

AI US 2002-153483 A1 20020522 (10)

RLI Continuation-in-part of Ser. No. US 2001-34451, filed on 28 Dec 2001,  
PENDING

PRAI WO 2001-US50825 20011228

US 2001-293861P 20010525 (60)

DT Utility

FS APPLICATION

LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE  
3200, CHICAGO, IL, 60606

CLMN Number of Claims: 38

ECL Exemplary Claim: 1

DRWN 9 Drawing Page(s)

LN.CNT 1113

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The present invention relates composite core/shell **nanoparticles** and a **two**-step method for their preparation. The present invention further relates to biomolecule-core/shell nanoparticle conjugates and methods for their preparation. The invention also relates to methods of detection of biomolecules comprising the biomolecule-core/shell nanoparticle conjugates.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 36 OF 64 USPATFULL on STN

AN 2003:133944 USPATFULL

TI Magneitc-nanoparticle conjugates and methods of use

IN Josephson, Lee, Arlington, VA, UNITED STATES

Weissleder, Ralph, Charlestown, MA, UNITED STATES

Perez, J. Manuel, Boston, MA, UNITED STATES

PI US 2003092029 A1 20030515

AI US 2002-165258 A1 20020606 (10)

PRAI US 2001-296378P 20010606 (60)

DT Utility

FS APPLICATION

LREP FISH & RICHARDSON PC, 225 FRANKLIN ST, BOSTON, MA, 02110

CLMN Number of Claims: 82

ECL Exemplary Claim: 1

DRWN 10 Drawing Page(s)

LN.CNT 2297

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The present invention provides novel compositions of binding moiety-nanoparticle conjugates, **aggregates** of these conjugates, and novel methods of using these conjugates, and **aggregates**. The nanoparticles in these conjugates can be magnetic metal oxides, either monodisperse or polydisperse. Binding moieties can be, e.g., **oligonucleotides**, polypeptides, or polysaccharides. **Oligonucleotide** sequences are linked to either non-polymer surface functionalized metal oxides or with functionalized polymers associated with the metal oxides. The novel compositions can be used in assays for detecting target molecules, such as nucleic acids and proteins, in vitro or as magnetic resonance (MR) contrast agents to detect target molecules in living organisms.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 37 OF 64 USPATFULL on STN

AN 2003:127030 USPATFULL

TI Nanoparticles having oligonucleotides attached thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, UNITED STATES

Letsinger, Robert L., Wilmette, IL, UNITED STATES

Taton, Thomas Andrew, Little Canada, MN, UNITED STATES

Lu, Gang, Mt Prospect, IL, UNITED STATES

PI US 2003087242 A1 20030508

AI US 2001-8978 A1 20011207 (10)

RLI Continuation-in-part of Ser. No. US 2001-927777, filed on 10 Aug 2001, PENDING Continuation-in-part of Ser. No. US 2001-820279, filed on 28 Mar 2001, PENDING Continuation-in-part of Ser. No. US 2001-760500, filed on 12 Jan 2001, PENDING Continuation-in-part of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)

US 2000-176409P 20000113 (60)

US 2000-192699P 20000328 (60)

US 2000-200161P 20000426 (60)  
US 2000-213906P 20000626 (60)  
US 2000-224631P 20000811 (60)  
US 2000-254392P 20001208 (60)  
US 2000-254418P 20001208 (60)  
US 2000-255235P 20001211 (60)  
US 2000-255236P 20001211 (60)  
US 2001-282640P 20010409 (60)

DT Utility

FS APPLICATION

LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE  
3200, CHICAGO, IL, 60606

CLMN Number of Claims: 626

ECL Exemplary Claim: 1

DRWN 71 Drawing Page(s)

LN.CNT 12308

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 38 OF 64 USPATFULL on STN

AN 2003:120107 USPATFULL

TI Method for immobilizing molecules onto surfaces

IN Garimella, Viswanadham, Evanston, IL, UNITED STATES

PI US 2003082588 A1 20030501

AI US 2002-194138 A1 20020712 (10)

PRAI US 2001-305369P 20010713 (60)

US 2002-363472P 20020312 (60)

DT Utility

FS APPLICATION

LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE  
3200, CHICAGO, IL, 60606

CLMN Number of Claims: 44

ECL Exemplary Claim: 1

DRWN 8 Drawing Page(s)

LN.CNT 1190

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A method for immobilizing amino-group containing molecules onto surfaces and devices having immobilized isocyanate-group containing molecules prepared by the method are disclosed. The method comprises reacting a surface (i.e., glass surface) having free hydroxyl groups with a silyl isocyanate derivatizing agent to provide immobilized reactive moieties, the agent having a formula:

(R.sub.10) (R.sub.20) (R.sub.30) Si--X--NCO

wherein R.sub.1, R.sub.2 and R.sub.3 are independently represents  
C.sub.1-C.sub.6 alkyl, phenyl, or aryl substituted with one or more  
groups selected from the group consisting of C.sub.1-C.sub.6 alkyl and

C.sub.1-C.sub.6 alkoxy; X represents linear or branched C.sub.1-C.sub.20 alkyl or aryl substituted with one or more groups selected from the group consisting of C.sub.1-C.sub.6 alkyl and C.sub.1-C.sub.6 alkoxy, optionally substituted with one or more heteroatoms comprising oxygen, nitrogen, and sulfur and reacting the immobilized reactive moieties with the amino group-containing molecule so as to immobilize said molecule on the surface. Devices having a surface with immobilized molecules such as nucleic acids or proteins are useful for detection of target analytes in a sample.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 39 OF 64 USPATFULL on STN  
AN 2003:106233 USPATFULL  
TI Compositions and methods for the therapy and diagnosis of pancreatic cancer  
IN Benson, Darin R., Seattle, WA, UNITED STATES  
Kalos, Michael D., Seattle, WA, UNITED STATES  
Lodes, Michael J., Seattle, WA, UNITED STATES  
Persing, David H., Redmond, WA, UNITED STATES  
Heppler, William T., Seattle, WA, UNITED STATES  
Jiang, Yuqiu, Kent, WA, UNITED STATES  
PA Corixa Corporation, Seattle, WA, UNITED STATES, 98104 (U.S. corporation)  
PI US 2003073144 A1 20030417  
AI US 2002-60036 A1 20020130 (10)  
PRAI US 2001-333626P 20011127 (60)  
US 2001-305484P 20010712 (60)  
US 2001-265305P 20010130 (60)  
US 2001-267568P 20010209 (60)  
US 2001-313999P 20010820 (60)  
US 2001-291631P 20010516 (60)  
US 2001-287112P 20010428 (60)  
US 2001-278651P 20010321 (60)  
US 2001-265682P 20010131 (60)  
DT Utility  
FS APPLICATION  
LREP SEED INTELLECTUAL PROPERTY LAW GROUP PLLC, 701 FIFTH AVE, SUITE 6300, SEATTLE, WA, 98104-7092  
CLMN Number of Claims: 17  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 14253

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Compositions and methods for the therapy and diagnosis of cancer, particularly pancreatic cancer, are disclosed. Illustrative compositions comprise one or more pancreatic tumor polypeptides, immunogenic portions thereof, polynucleotides that encode such polypeptides, antigen presenting cell that expresses such polypeptides, and T cells that are specific for cells expressing such polypeptides. The disclosed compositions are useful, for example, in the diagnosis, prevention and/or treatment of diseases, particularly pancreatic cancer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 40 OF 64 USPATFULL on STN  
AN 2003:99517 USPATFULL  
TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES

PA Nanosphere, Inc. (U.S. corporation)  
PI US 2003068622 A1 20030410  
AI US 2001-976863 A1 20011012 (9)  
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 431  
ECL Exemplary Claim: 1  
DRWN 46 Drawing Page(s)  
LN.CNT 8059  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
AB The invention provides methods of detecting a nucleic acid. The methods  
comprise contacting the nucleic acid with one or more types of  
**particles** having **oligonucleotides** attached thereto. In  
one embodiment of the method, the **oligonucleotides** are  
attached to **nanoparticles** and have sequences complementary to  
portions of the sequence of the nucleic acid. A detectable change  
(preferably a color change) is brought about as a result of the  
hybridization of the **oligonucleotides** on the  
**nanoparticles** to the nucleic acid. The invention also provides  
compositions and kits comprising **particles**. The invention  
further provides methods of synthesizing unique **nanoparticle-**  
**oligonucleotide** conjugates, the conjugates produced by the  
methods, and methods of using the conjugates. In addition, the invention  
provides nanomaterials and nanostructures comprising nanoparticles and  
methods of nanofabrication utilizing nanoparticles. Finally, the  
invention provides a method of separating a selected nucleic acid from  
other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 41 OF 64 USPATFULL on STN  
AN 2003:86172 USPATFULL  
TI **Nanoparticles** having **oligonucleotides** attached  
thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES  
PA Nanosphere, Inc. (U.S. corporation)  
PI US 2003059777 A1 20030327  
US 6645721 B2 20031111  
AI US 2001-957313 A1 20010920 (9)  
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 431

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 8060

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of **particles** having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising **particles**. The invention further provides methods of synthesizing unique **nanoparticle-oligonucleotide** conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 42 OF 64 USPATFULL on STN

AN 2003:78438 USPATFULL

TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES

PA Nanosphere, Inc. (U.S. corporation)

PI US 2003054358 A1 20030320

AI US 2001-975376 A1 20011011 (9)

RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)

US 2000-200161P 20000426 (60)

DT Utility

FS APPLICATION

LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 431

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 8059

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of **particles** having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising **particles**. The invention

further provides methods of synthesizing unique **nanoparticle-oligonucleotide** conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 43 OF 64 USPATFULL on STN  
AN 2003:71346 USPATFULL  
TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES  
PA Nanosphere, Inc.  
PI US 2003049631 A1 20030313  
US 6709825 B2 20040323  
AI US 2001-974500 A1 20011010 (9)  
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 172  
ECL Exemplary Claim: 1  
DRWN 46 Drawing Page(s)  
LN.CNT 6565

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise (contacting the nucleic acid with one or more types of **particles** having **oligonucleotides** attached thereto, In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising **particles** The invention further provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing the nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 44 OF 64 USPATFULL on STN  
AN 2003:30222 USPATFULL  
TI Nanoparticles having oligonucleotides attached thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Park, So-Jung, Evanston, IL, UNITED STATES  
PI US 2003022169 A1 20030130

US 6750016                    B2    20040615  
AI    US 2001-820279            A1    20010328 (9)  
RLI    Continuation-in-part of Ser. No. US 2001-760500, filed on 12 Jan 2001,  
      PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun  
      1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
      1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
      Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
PRAI    US 1996-31809P            19960729 (60)  
      US 2000-176409P           20000113 (60)  
      US 2000-200161P           20000426 (60)  
      US 2000-192699P           20000328 (60)  
      US 2000-254392P           20001208 (60)  
      US 2000-255235P           20001211 (60)  
DT    Utility  
FS    APPLICATION  
LREP    MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE  
      3200, CHICAGO, IL, 60606  
CLMN    Number of Claims: 570  
ECL    Exemplary Claim: 1  
DRWN    65 Drawing Page(s)  
LN.CNT 11127

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB    The invention provides methods of detecting a nucleic acid. The methods  
      comprise contacting the nucleic acid with one or more types of particles  
      having oligonucleotides attached thereto. In one embodiment of the  
      method, the oligonucleotides are attached to nanoparticles and have  
      sequences complementary to portions of the sequence of the nucleic acid.  
      A detectable change (preferably a color change) is brought about as a  
      result of the hybridization of the oligonucleotides on the nanoparticles  
      to the nucleic acid. The invention also provides compositions and kits  
      comprising particles. The invention further provides methods of  
      synthesizing unique nanoparticle-oligonucleotide conjugates, the  
      conjugates produced by the methods, and methods of using the conjugates.  
      In addition, the invention provides nanomaterials and nanostructures  
      comprising nanoparticles and methods of nanofabrication utilizing  
      nanoparticles. Finally, the invention provides a method of separating a  
      selected nucleic acid from other nucleic acids.F

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5    ANSWER 45 OF 64    USPATFULL on STN  
AN    2003:19429    USPATFULL  
TI    Self-assembly of mesoscale objects  
IN    Bowden, Ned B., Somerville, MA, United States  
      Terfort, Andreas W., Halstenbek, GERMANY, FEDERAL REPUBLIC OF  
      Carbeck, Jeffrey D., Princeton, NJ, United States  
      Whitesides, George M., Newton, MA, United States  
PA    President and Fellows of Harvard College, Cambridge, MA, United States  
      (U.S. corporation)  
PI    US 6507989            B1    20030121  
AI    US 1997-816662           19970313 (8)  
DT    Utility  
FS    GRANTED  
EXNAM    Primary Examiner: Arbes, Carl J.  
LREP    Wolf, Greenfield & Sacks, P.C  
CLMN    Number of Claims: 22  
ECL    Exemplary Claim: 1  
DRWN    19 Drawing Figure(s); 12 Drawing Page(s)  
LN.CNT 1192  
AB    Self-assembling systems include component articles that can be pinned at  
      a fluid/fluid interface, or provided in a fluid, or provided in  
      proximity of a surface, and caused to self-assemble optionally via  
      agitation. A self-assembling electrical circuit is provided.

L5 ANSWER 46 OF 64 USPATFULL on STN  
 AN 2003:13189 USPATFULL  
 TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, United States  
 Letsinger, Robert L., Wilmette, IL, United States  
 Mucic, Robert C., Glendale, CA, United States  
 Storhoff, James J., Evanston, IL, United States  
 Elghanian, Robert, Chicago, IL, United States  
 Taton, Thomas A., Chicago, IL, United States  
 PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)  
 PI US 6506564 B1 20030114  
 AI US 2000-603830 20000626 (9)  
 RLI Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999  
 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999  
 Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997  
 PRAI US 2000-200161P 20000426 (60)  
 US 1996-31809P 19960729 (60)  
 DT Utility  
 FS GRANTED  
 EXNAM Primary Examiner: Riley, Jezia  
 LREP McDonnell Boehnen Hulbert & Berghoff  
 CLMN Number of Claims: 42  
 ECL Exemplary Claim: 1  
 DRWN 84 Drawing Figure(s); 47 Drawing Page(s)  
 LN.CNT 5976  
 CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
 AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of **particles** having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising **particles**. The invention further provides methods of synthesizing unique **nanoparticle-oligonucleotide** conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 47 OF 64 USPATFULL on STN  
 AN 2002:337329 USPATFULL  
 TI Bio-barcode based on **oligonucleotide-modified nanoparticles**  
 IN Mirkin, Chad A., Willmette, IL, UNITED STATES  
 Park, So-Jung, Evanston, IL, UNITED STATES  
 Nam, Jwa-Min, Evanston, IL, UNITED STATES  
 PI US 2002192687 A1 20021219  
 AI US 2002-108211 A1 20020327 (10)  
 RLI Continuation-in-part of Ser. No. US 2001-820279, filed on 28 Mar 2001, PENDING  
 PRAI WO 2001-US10071 20010328  
 US 2000-192699P 20000328 (60)  
 US 2001-350560P 20011113 (60)  
 DT Utility  
 FS APPLICATION

LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE  
3200, CHICAGO, IL, 60606

CLMN Number of Claims: 41

ECL Exemplary Claim: 1

DRWN 4 Drawing Page(s)

LN.CNT 2185

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The present invention relates to a screening methods, compositions, and kits for detecting for the presence or absence of one or more target analytes, e.g. proteins such as antibodies, in a sample. In particular, the present invention relates to a method that utilizes reporter **oligonucleotides** as biochemical barcodes for detecting multiple protein structures or other target analytes in one solution.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 48 OF 64 USPATFULL on STN

AN 2002:332594 USPATFULL

TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, United States  
Letsinger, Robert L., Wilmette, IL, United States  
Mucic, Robert C., Glendale, CA, United States  
Storhoff, James J., Evanston, IL, United States  
Elghanian, Robert, Chicago, IL, United States

PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)

PI US 6495324 B1 20021217

AI US 2000-693005 20001020 (9)

RLI Division of Ser. No. US 1999-344667, filed on 25 Jun 1999  
Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999  
Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997

PRAI US 1996-31809P 19960729 (60)

DT Utility

FS GRANTED

EXNAM Primary Examiner: Riley, Jezia

LREP McDonnell Boehnen Hulbert & Berghoff

CLMN Number of Claims: 21

ECL Exemplary Claim: 1

DRWN 62 Drawing Figure(s); 34 Drawing Page(s)

LN.CNT 4289

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of **particles** having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising **particles**. The invention further provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing the nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 49 OF 64 USPATFULL on STN

AN 2002:314666 USPATFULL

TI Non-alloying core shell nanoparticles

IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Cao, Yun-Wei, Evanston, IL, UNITED STATES  
Jin, Rongchao, Evanston, IL, UNITED STATES

PI US 2002177143 A1 20021128  
AI US 2001-34451 A1 20011228 (10)  
PRAI US 2001-293861P 20010525 (60)  
DT Utility  
FS APPLICATION  
LREP MCDONNELL BOEHNNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE  
3200, CHICAGO, IL, 60606  
CLMN Number of Claims: 35  
ECL Exemplary Claim: 1  
DRWN 7 Drawing Page(s)  
LN.CNT 1075  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
AB The present invention relates composite core/shell **nanoparticles**  
and a **two**-step method for their preparation. The present  
invention further relates to biomolecule-core/shell nanoparticle  
conjugates and methods for their preparation. The invention also relates  
to methods of detection of biomolecules comprising the biomolecule or  
specific binding substance-core/shell nanoparticle conjugates.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 50 OF 64 USPATFULL on STN  
AN 2002:287518 USPATFULL  
TI **Nanoparticles** having **oligonucleotides** attached  
thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas Andrew, Little Canada, MN, UNITED STATES  
PA Nanosphere, Inc. (U.S. corporation)  
PI US 2002160381 A1 20021031  
AI US 2001-975498 A1 20011011 (9)  
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
PENDING Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan  
1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed  
on 21 Jul 1997, UNKNOWN  
PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 431  
ECL Exemplary Claim: 1  
DRWN 46 Drawing Page(s)  
LN.CNT 5695  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods  
comprise contacting the nucleic acid with one or more types of  
**particles** having **oligonucleotides** attached thereto. In  
one embodiment of the method, the **oligonucleotides** are  
attached to **nanoparticles** and have sequences complementary to  
portions of the sequence of the nucleic acid. A detectable change  
(preferably a color change) is brought about as a result of the  
hybridization of the **oligonucleotides** on the  
**nanoparticles** to the nucleic acid. The invention also provides  
compositions and kits comprising **particles**. The invention  
further provides methods of synthesizing unique **nanoparticle-**  
**oligonucleotide** conjugates, the conjugates produced by the  
methods, and methods of using the conjugates. In addition, the invention  
provides nanomaterials and nanostructures comprising nanoparticles and

methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 51 OF 64 USPATFULL on STN  
AN 2002:280008 USPATFULL  
TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Chicago, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES  
Garimella, Viswanadham, Evanston, IL, UNITED STATES  
Li, Zhi, Evanston, IL, UNITED STATES  
PI US 2002155442 A1 20021024  
AI US 2001-760500 A1 20010112 (9)  
RLI Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)  
US 2000-176409P 20000113 (60)  
US 2000-213906P 20000626 (60)  
DT Utility  
FS APPLICATION  
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE 3200, CHICAGO, IL, 60606  
CLMN Number of Claims: 485  
ECL Exemplary Claim: 1  
DRWN 51 Drawing Page(s)  
LN.CNT 8754

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of **particles** having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising **particles**. The invention further provides methods of synthesizing unique **nanoparticle-oligonucleotide** conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 52 OF 64 USPATFULL on STN  
AN 2002:272801 USPATFULL  
TI Compositions and methods for the therapy and diagnosis of colon cancer  
IN Stolk, John A., Bothell, WA, UNITED STATES  
Xu, Jiangchun, Bellevue, WA, UNITED STATES  
Chenault, Ruth A., Seattle, WA, UNITED STATES  
Meagher, Madeleine Joy, Seattle, WA, UNITED STATES

PA Corixa Corporation, Seattle, WA, UNITED STATES, 98104 (U.S. corporation)  
PI US 2002150922 A1 20021017  
AI US 2001-998598 A1 20011116 (9)  
PRAI US 2001-304037P 20010710 (60)  
US 2001-279670P 20010328 (60)  
US 2001-267011P 20010206 (60)  
US 2000-252222P 20001120 (60)  
DT Utility  
FS APPLICATION  
LREP SEED INTELLECTUAL PROPERTY LAW GROUP PLLC, 701 FIFTH AVE, SUITE 6300,  
SEATTLE, WA, 98104-7092  
CLMN Number of Claims: 17  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 9233

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Compositions and methods for the therapy and diagnosis of cancer, particularly colon cancer, are disclosed. Illustrative compositions comprise one or more colon tumor polypeptides, immunogenic portions thereof, polynucleotides that encode such polypeptides, antigen presenting cell that expresses such polypeptides, and T cells that are specific for cells expressing such polypeptides. The disclosed compositions are useful, for example, in the diagnosis, prevention and/or treatment of diseases, particularly colon cancer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 53 OF 64 USPATFULL on STN  
AN 2002:265869 USPATFULL  
TI Methods and reagents for multiplexed analyte capture, surface array self-assembly, and analysis of complex biological samples  
IN Natan, Michael J., Los Altos, CA, UNITED STATES  
Schulman, Howard, Palo Alto, CA, UNITED STATES  
PA SURROMED, INC., Mountain View, CA (U.S. corporation)  
PI US 2002146745 A1 20021010  
AI US 2002-115863 A1 20020403 (10)  
PRAI US 2001-281228P 20010403 (60)  
US 2001-281041P 20010403 (60)  
DT Utility  
FS APPLICATION  
LREP SWANSON & BRATSCHUN L.L.C., 1745 SHEA CENTER DRIVE, SUITE 330, HIGHLANDS RANCH, CO, 80129  
CLMN Number of Claims: 20  
ECL Exemplary Claim: 1  
DRWN 5 Drawing Page(s)  
LN.CNT 1204

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Bifunctional capture probes used for multiplexed assays consist of **particles** bearing analyte-binding moieties and pairing **oligonucleotides**, which hybridize to an array of surface-bound capture **oligonucleotides**. Capture probes are combined with a sample containing analytes of interest, extracted from the sample, and then exposed to the **oligonucleotide** array. Based on their pairing **oligonucleotide** sequences, the capture probes self-assemble at particular array locations. Bound analytes are then detected using a method, such as mass spectrometry, that can be directed toward particular array locations. Because any number and combination of capture probes can be employed, the method is flexible and able to detect analytes at very low concentrations. Additionally, the method provides the ease of detection associated with position-addressable arrays.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 54 OF 64 USPATFULL on STN  
 AN 2002:251128 USPATFULL  
 TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
 Letsinger, Robert L., Wilmette, IL, UNITED STATES  
 Mucic, Robert C., Glendale, CA, UNITED STATES  
 Storhoff, James J., Evanston, IL, UNITED STATES  
 Elghanian, Robert, Skokie, IL, UNITED STATES  
 Taton, Thomas A., Little Canada, MN, UNITED STATES  
 PA Nanosphere, Inc. (U.S. corporation)  
 PI US 2002137072 A1 20020926  
 US 6730269 B2 20040504  
 AI US 2001-976617 A1 20011012 (9)  
 RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
 Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
 PRAI US 1996-31809P 19960729 (60)  
 US 2000-200161P 20000426 (60)  
 DT Utility  
 FS APPLICATION  
 LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606  
 CLMN Number of Claims: 431  
 ECL Exemplary Claim: 1  
 DRWN 46 Drawing Page(s)  
 LN.CNT 8061  
 CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
 AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of **particles** having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising **particles**. The invention further provides methods of synthesizing unique **nanoparticle-oligonucleotide** conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 55 OF 64 USPATFULL on STN  
 AN 2002:251127 USPATFULL  
 TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
 Letsinger, Robert L., Wilmette, IL, UNITED STATES  
 Mucic, Robert C., Glendale, CA, UNITED STATES  
 Storhoff, James J., Evanston, IL, UNITED STATES  
 Elghanian, Robert, Skokie, IL, UNITED STATES  
 Taton, Thomas A., Little Canada, MN, UNITED STATES  
 PA Nanosphere, Inc. (U.S. corporation)  
 PI US 2002137071 A1 20020926  
 AI US 2001-974007 A1 20011010 (9)  
 RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING

Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)

DT Utility

FS APPLICATION

LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 431

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 8063

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods  
comprise contacting the nucleic acid with one or more types of  
**particles** having **oligonucleotides** attached thereto. In  
one embodiment of the method, the **oligonucleotides** are  
attached to **nanoparticles** and have sequences complementary to  
portions of the sequence of the nucleic acid. A detectable change  
(preferably a color change) is brought about as a result of the  
hybridization of the **oligonucleotides** on the  
**nanoparticles** to the nucleic acid. The invention also provides  
compositions and kits comprising **particles**. The invention  
further provides methods of synthesizing unique **nanoparticle-**  
**oligonucleotide** conjugates, the conjugates produced by the  
methods, and methods of using the conjugates. In addition, the invention  
provides nanomaterials and nanostructures comprising nanoparticles and  
methods of nanofabrication utilizing nanoparticles. Finally, the  
invention provides a method of separating a selected nucleic acid from  
other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 56 OF 64 USPTFULL on STN

AN 2002:251126 USPTFULL

TI **Nanoparticles** having **oligonucleotides** attached  
thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Skokie, IL, UNITED STATES  
Taton, Thomas A., Little Canada, MN, UNITED STATES

PA Nanosphere, Inc. (U.S. corporation)

PI US 2002137070 A1 20020926

AI US 2001-973638 A1 20011010 (9)

RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)  
US 2000-200161P 20000426 (60)

DT Utility

FS APPLICATION

LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 431

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 8060

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of **particles** having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising **particles**. The invention further provides methods of synthesizing unique **nanoparticle-oligonucleotide** conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 57 OF 64 USPATFULL on STN  
AN 2002:251114 USPATFULL  
TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor  
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Mucic, Robert C., Glendale, CA, UNITED STATES  
Storhoff, James J., Evanston, IL, UNITED STATES  
Elghanian, Robert, Chicago, IL, UNITED STATES  
PA Nanosphere, Inc. (U.S. corporation)  
PI US 2002137058 A1 20020926  
AI US 2001-923625 A1 20010807 (9)  
RLI Continuation of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED  
Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
PRAI US 1996-31809P 19960729 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 105  
ECL Exemplary Claim: 1  
DRWN 26 Drawing Page(s)  
LN.CNT 3903

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of **particles** having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising **particles**. The invention further provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing the nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 58 OF 64 USPATFULL on STN  
AN 2002:243051 USPATFULL

TI Compositions and methods for the therapy and diagnosis of ovarian cancer  
IN Algate, Paul A., Issaquah, WA, UNITED STATES  
Jones, Robert, Seattle, WA, UNITED STATES  
Harlocker, Susan L., Seattle, WA, UNITED STATES  
PA Corixa Corporation, Seattle, WA, UNITED STATES, 98104 (U.S. corporation)  
PI US 2002132237 A1 20020919  
AI US 2001-867701 A1 20010529 (9)  
PRAI US 2000-207484P 20000526 (60)  
DT Utility  
FS APPLICATION  
LREP SEED INTELLECTUAL PROPERTY LAW GROUP PLLC, 701 FIFTH AVE, SUITE 6300,  
SEATTLE, WA, 98104-7092  
CLMN Number of Claims: 11  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 25718

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Compositions and methods for the therapy and diagnosis of cancer,  
particularly ovarian cancer, are disclosed. Illustrative compositions  
comprise one or more ovarian tumor polypeptides, immunogenic portions  
thereof, polynucleotides that encode such polypeptides, antigen  
presenting cell that expresses such polypeptides, and T cells that are  
specific for cells expressing such polypeptides. The disclosed  
compositions are useful, for example, in the diagnosis, prevention  
and/or treatment of diseases, particularly ovarian cancer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 59 OF 64 USPATFULL on STN  
AN 2002:242791 USPATFULL  
TI Compositions and methods for the therapy and diagnosis of colon cancer  
IN King, Gordon E., Shoreline, WA, UNITED STATES  
Meagher, Madeleine Joy, Seattle, WA, UNITED STATES  
Xu, Jiangchun, Bellevue, WA, UNITED STATES  
Secrist, Heather, Seattle, WA, UNITED STATES  
PA Corixa Corporation, Seattle, WA, UNITED STATES (U.S. corporation)  
PI US 2002131971 A1 20020919  
AI US 2001-33528 A1 20011226 (10)  
RLI Continuation-in-part of Ser. No. US 2001-920300, filed on 31 Jul 2001,  
PENDING  
PRAI US 2001-302051P 20010629 (60)  
US 2001-279763P 20010328 (60)  
US 2000-223283P 20000803 (60)  
DT Utility  
FS APPLICATION  
LREP SEED INTELLECTUAL PROPERTY LAW GROUP PLLC, 701 FIFTH AVE, SUITE 6300,  
SEATTLE, WA, 98104-7092  
CLMN Number of Claims: 17  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 8083

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Compositions and methods for the therapy and diagnosis of cancer,  
particularly colon cancer, are disclosed. Illustrative compositions  
comprise one or more colon tumor polypeptides, immunogenic portions  
thereof, polynucleotides that encode such polypeptides, antigen  
presenting cell that expresses such polypeptides, and T cells that are  
specific for cells expressing such polypeptides. The disclosed  
compositions are useful, for example, in the diagnosis, prevention  
and/or treatment of diseases, particularly colon cancer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 60 OF 64 USPATFULL on STN

AN 2002:235385 USPATFULL  
 TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor  
 IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
 Letsinger, Robert L., Wilmette, IL, UNITED STATES  
 Mucic, Robert C., Glendale, CA, UNITED STATES  
 Storhoff, James J., Evanston, IL, UNITED STATES  
 Elghanian, Robert, Skokie, IL, UNITED STATES  
 Taton, Thomas A., Little Canada, MN, UNITED STATES  
 PA Nanosphere, Inc. (U.S. corporation)  
 PI US 2002127574 A1 20020912  
 US 6720411 B2 20040413  
 AI US 2001-973788 A1 20011010 (9)  
 RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING  
 Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,  
 GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US  
 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of  
 Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN  
 PRAI US 1996-31809P 19960729 (60)  
 US 2000-200161P 20000426 (60)  
 DT Utility  
 FS APPLICATION  
 LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
 Wacker Drive, Chicago, IL, 60606  
 CLMN Number of Claims: 431  
 ECL Exemplary Claim: 1  
 DRWN 46 Drawing Page(s)  
 LN.CNT 8060  
 CAS INDEXING IS AVAILABLE FOR THIS PATENT.  
 AB The invention provides methods of detecting a nucleic acid. The methods  
 comprise contacting the nucleic acid with one or more types of  
**particles** having **oligonucleotides** attached thereto. In  
 one embodiment of the method, the **oligonucleotides** are  
 attached to **nanoparticles** and have sequences complementary to  
 portions of the sequence of the nucleic acid. A detectable change  
 (preferably a color change) is brought about as a result of the  
 hybridization of the **oligonucleotides** on the  
**nanoparticles** to the nucleic acid. The invention also provides  
 compositions and kits comprising **particles**. The invention  
 further provides methods of synthesizing unique **nanoparticle-**  
**oligonucleotide** conjugates, the conjugates produced by the  
 methods, and methods of using the conjugates. In addition, the invention  
 provides nanomaterials and nanostructures comprising nanoparticles and  
 methods of nanofabrication utilizing nanoparticles. Finally, the  
 invention provides a method of separating a selected nucleic acid from  
 other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 61 OF 64 USPATFULL on STN  
 AN 2002:233054 USPATFULL  
 TI Silver stain removal by chemical etching and sonication  
 IN Mirkin, Chad A., Wilmette, IL, UNITED STATES  
 Park, So-Jung, Evanston, IL, UNITED STATES  
 Jin, Rongchao, Evanston, IL, UNITED STATES  
 PI US 2002125214 A1 20020912  
 US 6726847 B2 20040427  
 AI US 2001-998936 A1 20011130 (9)  
 PRAI US 2000-251715P 20001206 (60)  
 DT Utility  
 FS APPLICATION  
 LREP McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive,  
 Chicago, IL, 60606  
 CLMN Number of Claims: 13

ECL Exemplary Claim: 1

DRWN 1 Drawing Page(s)

LN.CNT 266

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB This invention relates to methods for regenerating spent DNA detection chips for further use. Specifically, this invention relates to a method for removal of silver from used DNA detection chips that employ gold **nanoparticle-oligonucleotide** conjugate probes and that use silver staining for signal amplification.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 62 OF 64 USPATFULL on STN

AN 2002:168347 USPATFULL

TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, United States  
Letsinger, Robert L., Wilmette, IL, United States  
Mucic, Robert C., Glendale, CA, United States  
Storhoff, James J., Evanston, IL, United States  
Elghanian, Robert, Chicago, IL, United States

PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)

PI US 6417340 B1 20020709

AI US 2000-693352 20001020 (9)

RLI Division of Ser. No. US 1999-344667, filed on 25 Jun 1999  
Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999,  
now abandoned Continuation-in-part of Ser. No. WO 1997-US12783, filed on  
21 Jul 1997

PRAI US 1996-31809P 19960729 (60)

DT Utility

FS GRANTED

EXNAM Primary Examiner: Riley, Jezia

LREP McDonnell Boehnen Hulbert & Berghoff

CLMN Number of Claims: 10

ECL Exemplary Claim: 1

DRWN 58 Drawing Figure(s); 34 Drawing Page(s)

LN.CNT 4214

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of **particles** having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising **particles**. The invention further provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing the nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 63 OF 64 USPATFULL on STN

AN 2002:63683 USPATFULL

TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, United States  
Letsinger, Robert L., Wilmette, IL, United States  
Mucic, Robert C., Glendale, CA, United States  
Storhoff, James J., Evanston, IL, United States  
Elghanian, Robert, Chicago, IL, United States

PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)  
PI US 6361944 B1 20020326  
AI US 1999-344667 19990625 (9)  
RLI Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999  
Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997  
PRAI US 1996-31809P 19960729 (60)  
DT Utility  
FS GRANTED  
EXNAM Primary Examiner: Riley, Jezia  
LREP McDonnell Boehnen Hulbert & Berghoff  
CLMN Number of Claims: 12  
ECL Exemplary Claim: 1  
DRWN 58 Drawing Figure(s); 34 Drawing Page(s)  
LN.CNT 4158

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of **particles** having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising **particles**. The invention further provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing the nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L5 ANSWER 64 OF 64 USPATFULL on STN  
AN 2002:60922 USPATFULL  
TI Method of detection by enhancement of silver staining  
IN Letsinger, Robert L., Wilmette, IL, UNITED STATES  
Garimella, Viswanadham, Evanston, IL, UNITED STATES  
PI US 2002034756 A1 20020321  
US 6602669 B2 20030805  
AI US 2001-903461 A1 20010711 (9)  
PRAI US 2000-217782P 20000711 (60)  
DT Utility  
FS APPLICATION  
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.  
Wacker Drive, Chicago, IL, 60606  
CLMN Number of Claims: 30  
ECL Exemplary Claim: 1  
DRWN 5 Drawing Page(s)  
LN.CNT 558

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The present invention relates to a method for amplifying a detection signal by enhancing or promoting the deposition of additional silver in assay detection systems where the formation of a silver spot serves as a reporter for the presence of a target molecule, including biological polymers (e.g., proteins and nucleic acids) and small molecules.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.